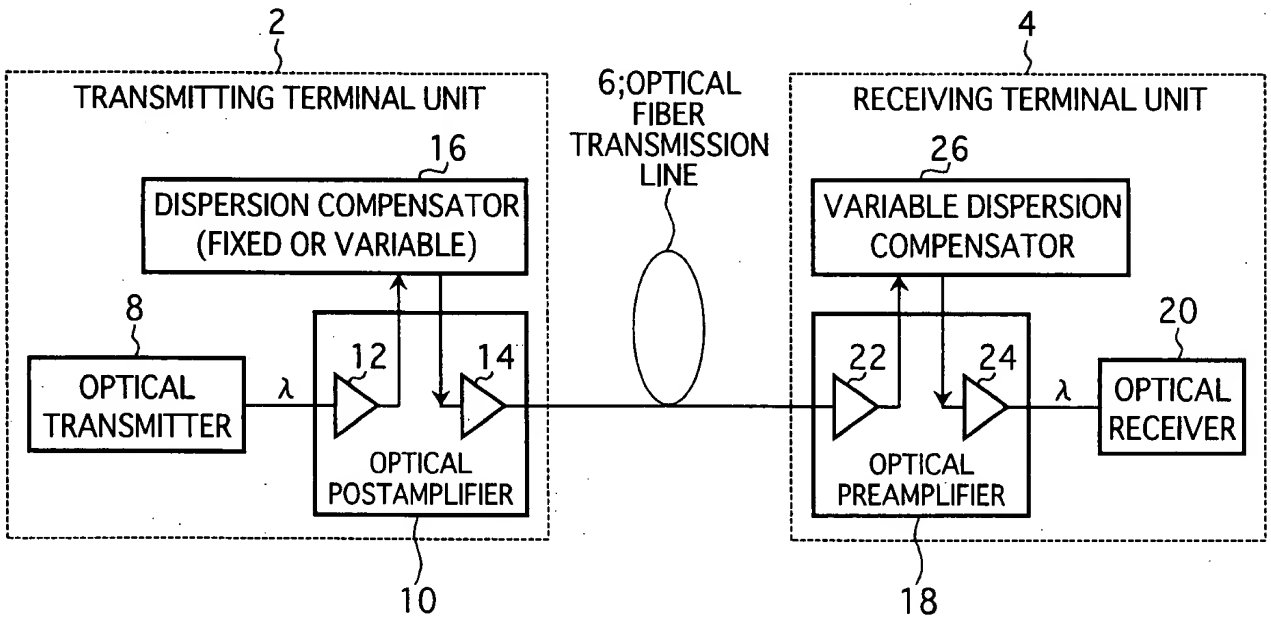
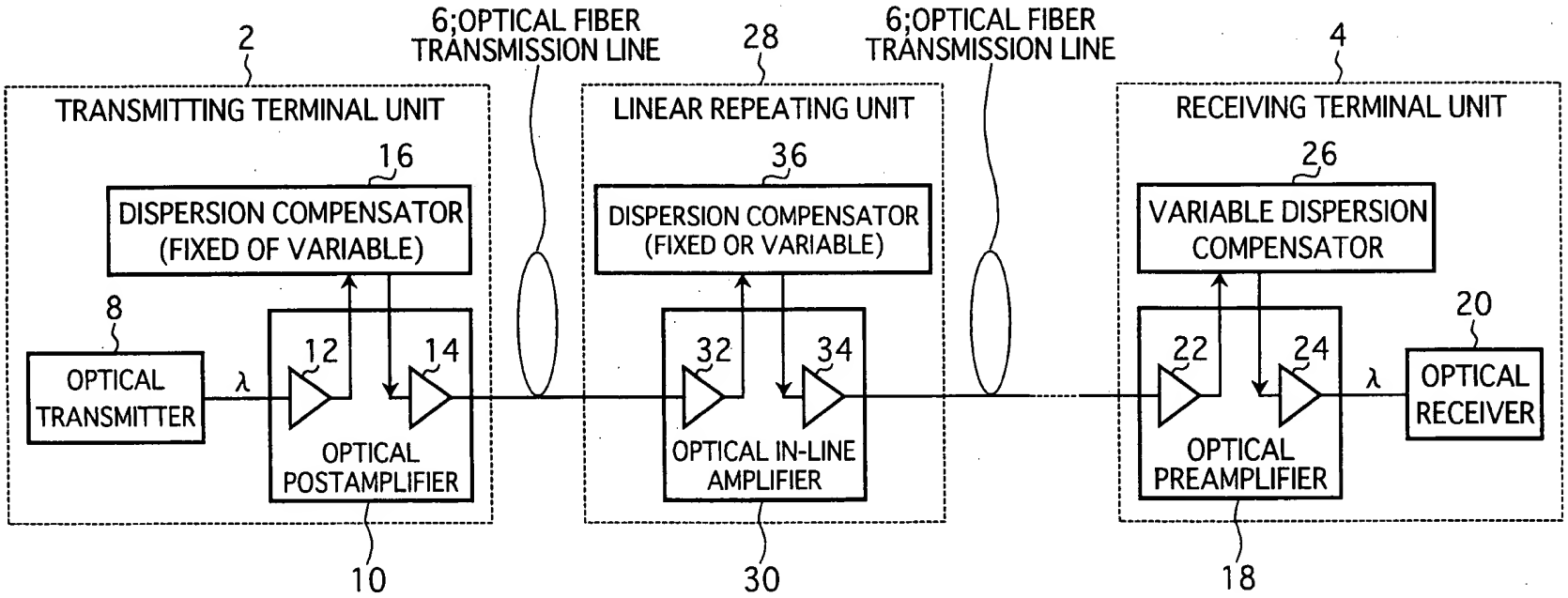
FIG. 1


2
TRANSMITTING TERMINAL UNIT
16
DISPERSION COMPENSATOR
(FIXED OR VARIABLE)
8
OPTICAL
TRANSMITTER
λ
12
14
OPTICAL
POSTAMPLIFIER
10
6;OPTICAL
FIBER
TRANSMISSION
LINE
4
RECEIVING TERMINAL UNIT
26
VARIABLE DISPERSION
COMPENSATOR
20
22
24
λ
OPTICAL
RECEIVER
OPTICAL
PREAMPLIFIER
18

JP2001-094869

FIG. 2



Translation Enhanced

FIG. 3

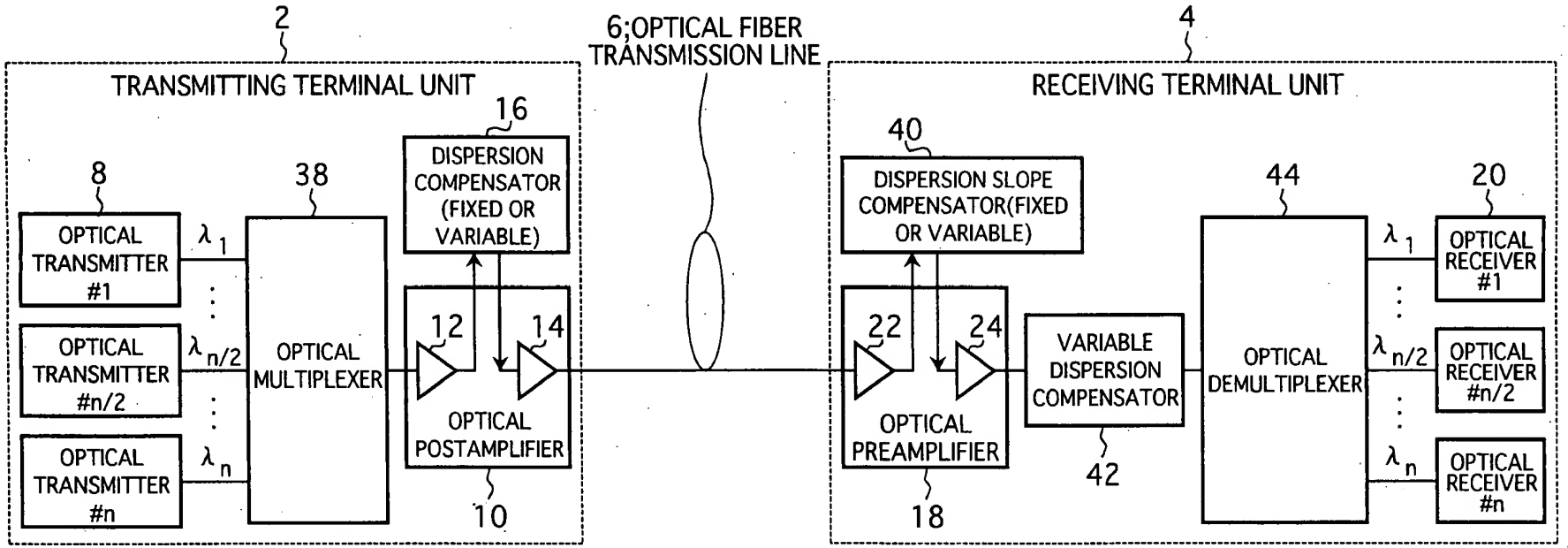


FIG. 4

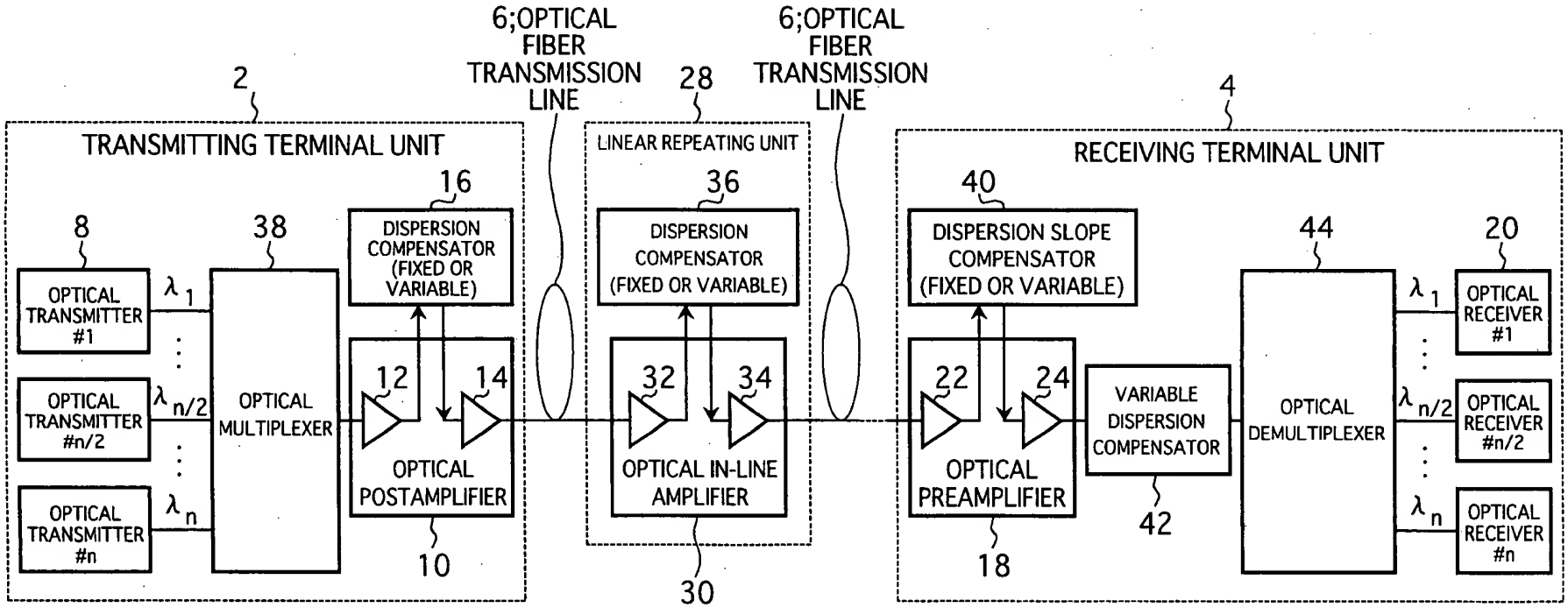
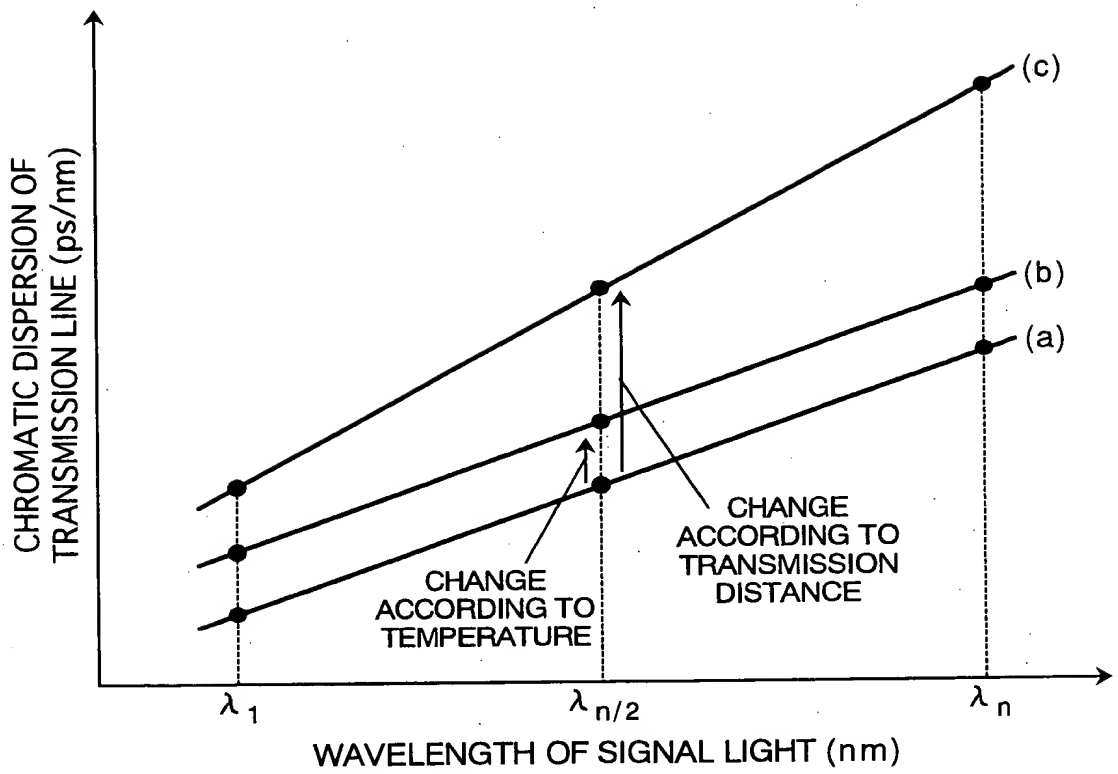

2
TRANSMITTING TERMINAL UNIT
8
OPTICAL TRANSMITTER #1
OPTICAL TRANSMITTER #n/2
OPTICAL TRANSMITTER #n
λ 1
λ n/2
λ n
38
OPTICAL MULTIPLEXER
16
DISPERSION COMPENSATOR (FIXED OR VARIABLE)
12
14
OPTICAL POSTAMPLIFIER
10
6;OPTICAL FIBER TRANSMISSION LINE
28
LINEAR REPEATING UNIT
36
DISPERSION COMPENSATOR (FIXED OR VARIABLE)
32
34
OPTICAL IN-LINE AMPLIFIER
30
6;OPTICAL FIBER TRANSMISSION LINE
4
RECEIVING TERMINAL UNIT
40
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
22
24
OPTICAL PREAMPLIFIER
18
VARIABLE DISPERSION COMPENSATOR
42
44
OPTICAL DEMULTIPLEXER
20
λ 1
λ n/2
λ n
OPTICAL RECEIVER #1
OPTICAL RECEIVER #n/2
OPTICAL RECEIVER #n

FIG. 5


CHROMATIC DISPERSION OF TRANSMISSION LINE (ps/nm)
(c)
(b)
(a)
CHANGE ACCORDING TO TRANSMISSION DISTANCE
CHANGE ACCORDING TO TEMPERATURE
λ 1
λ n/2
λ n
WAVELENGTH OF SIGNAL LIGHT (nm)

F I G. 6

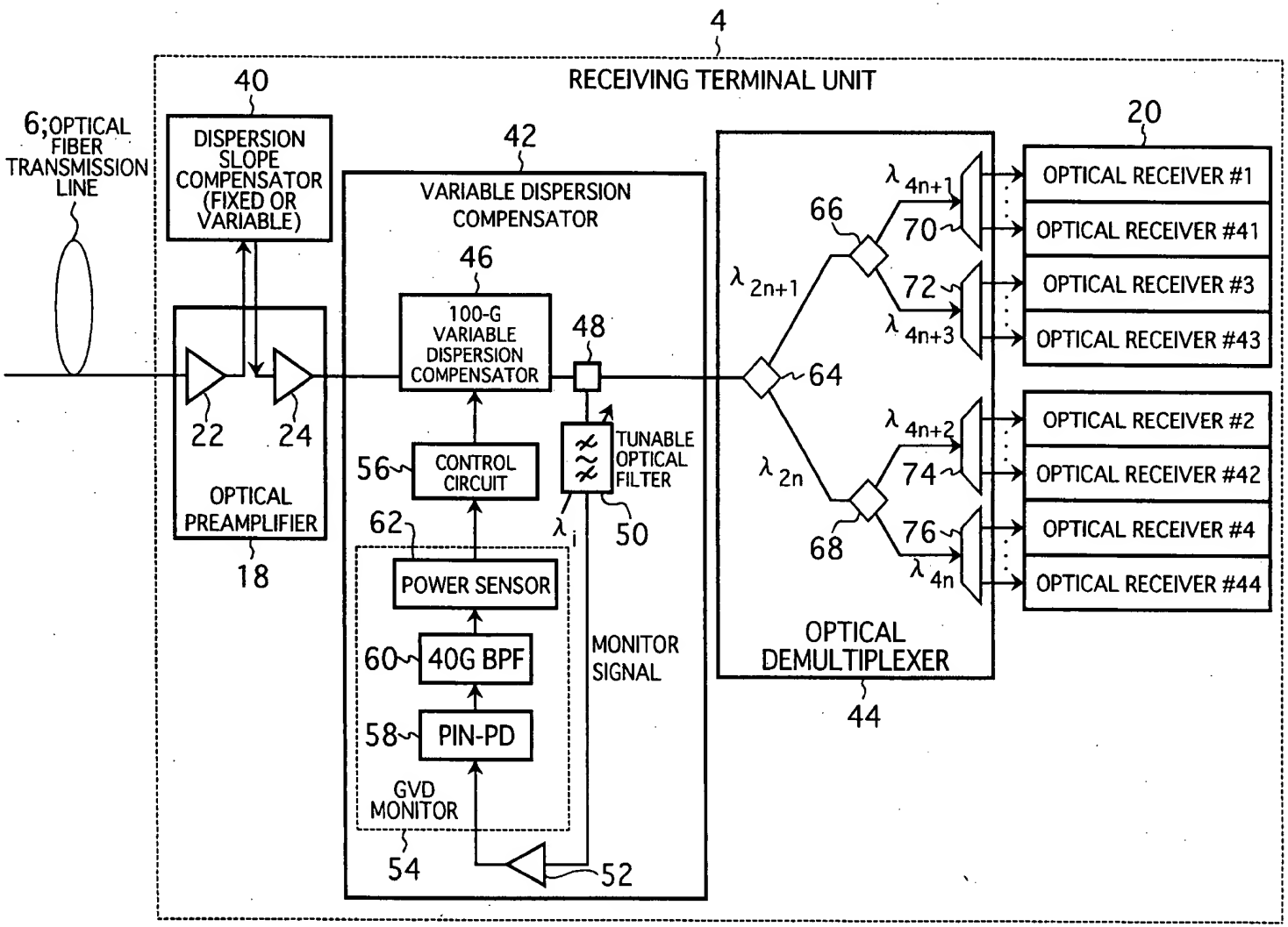

4
RECEIVING TERMINAL UNIT
6;OPTICAL FIBER TRANSMISSION LINE
40
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
42
VARIABLE DISPERSION COMPENSATOR
46
100-G VARIABLE DISPERSION COMPENSATOR
48
22
24
OPTICAL PREAMPLIFIER
18
56
CONTROL CIRCUIT
TUNABLE OPTICAL FILTER
50
62
POWER SENSOR
60
40G BPF
58
PIN-PD
GVD MONITOR
54
52
MONITOR SIGNAL
20
66
64
68
70
72
74
76
OPTICAL DEMULTIPLEXER
44
OPTICAL RECEIVER #1
OPTICAL RECEIVER #41
OPTICAL RECEIVER #3
OPTICAL RECEIVER #43
OPTICAL RECEIVER #2
OPTICAL RECEIVER #42
OPTICAL RECEIVER #4
OPTICAL RECEIVER #44

FIG. 7

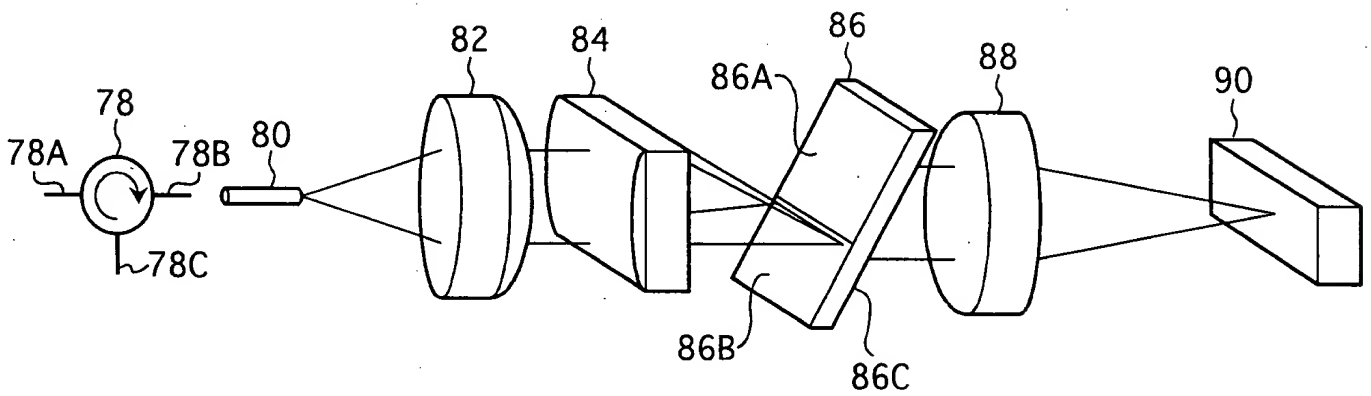
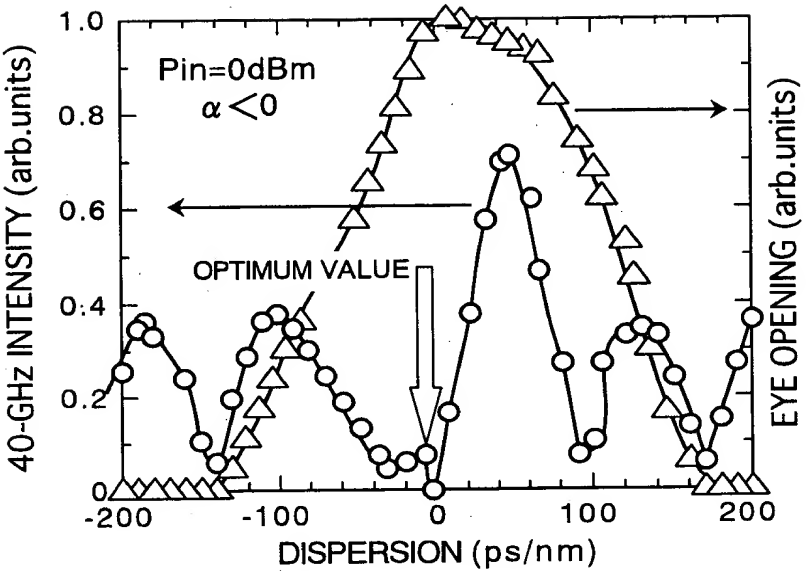


FIG. 8


Pin=0dBm
α<0
OPTIMUM VALUE
40-GHz INTENSITY (arb.units)
EYE OPENING (arb.units)
DISPERSION (ps/nm)
1.0
0.8
0.6
0.4
0.2
0
-200
-100
0
100
200

F I G. 9

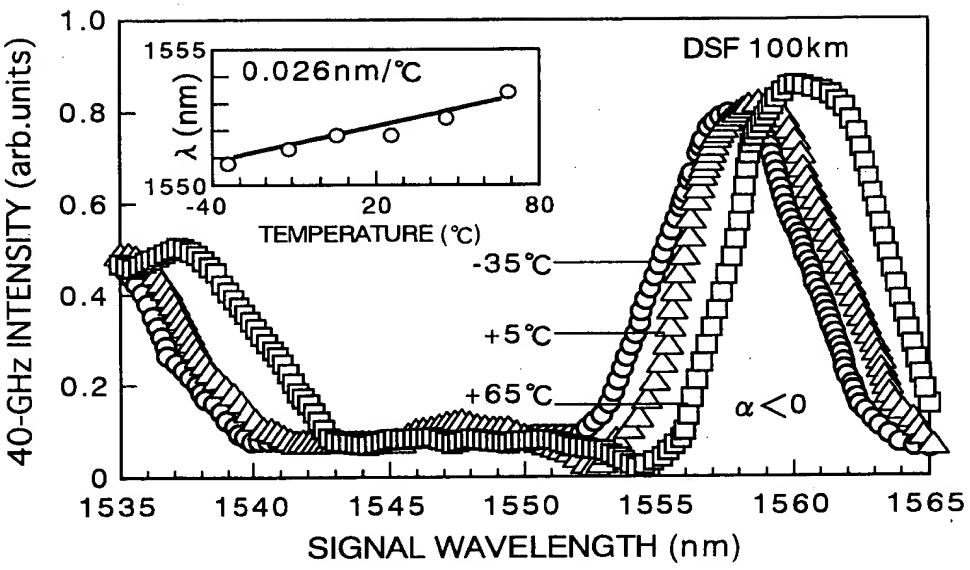

1.0
0.8
0.6
0.4
0.2
0
40-GHz INTENSITY (arb.units)
1535
1540
1545
1550
1555
1560
1565
SIGNAL WAVELENGTH (nm)
DSF 100km
-35℃
+5℃
+65℃
α<0
1555
0.026nm/℃
λ (nm)
1550
-40
20
80
TEMPERATURE (℃)

FIG. 10

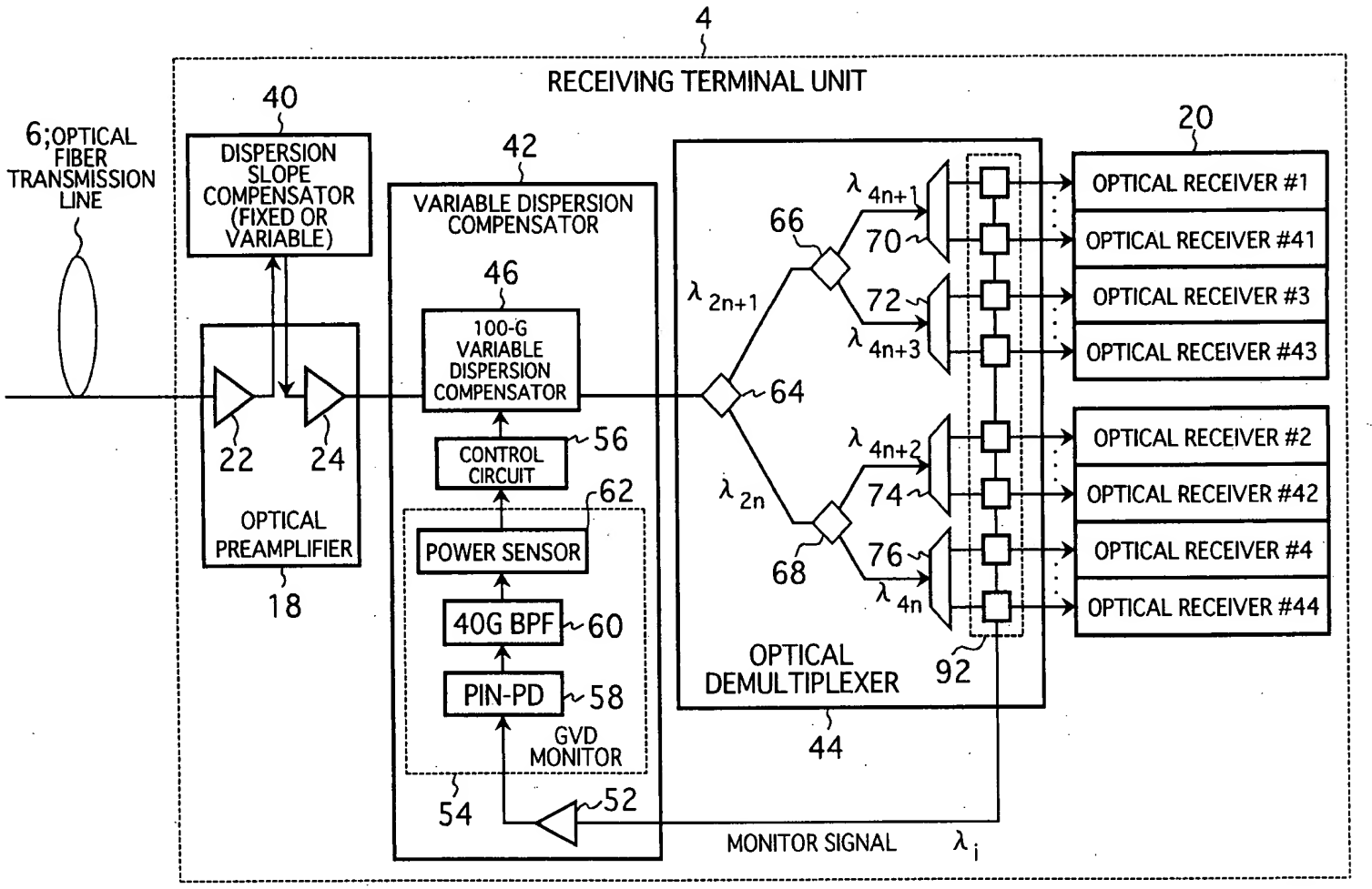
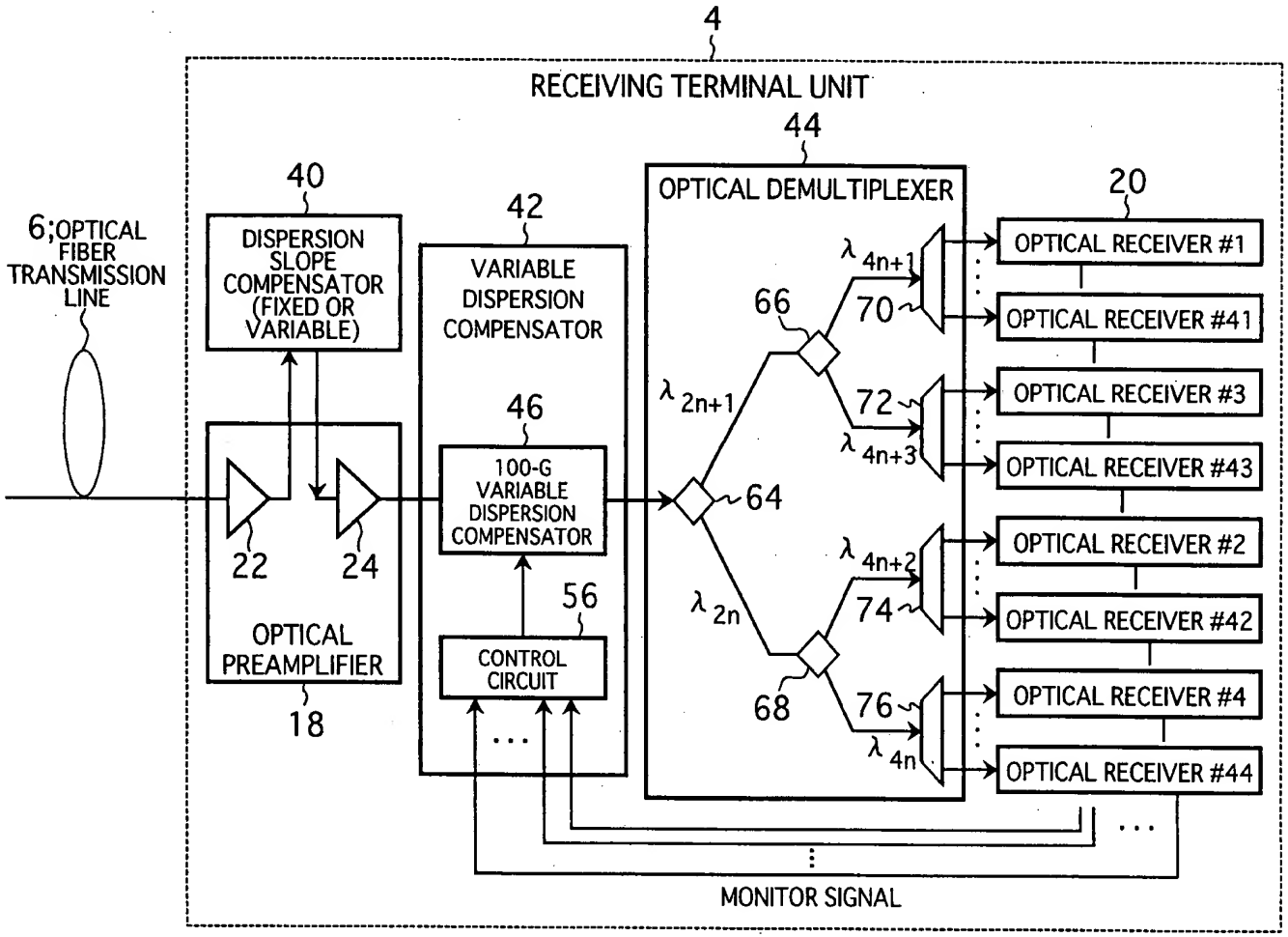

4
RECEIVING TERMINAL UNIT
6;OPTICAL FIBER TRANSMISSION LINE
40
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
42
VARIABLE DISPERSION COMPENSATOR
46
100-G VARIABLE DISPERSION COMPENSATOR
22
24
OPTICAL PREAMPLIFIER
18
CONTROL CIRCUIT
56
62
POWER SENSOR
40G BPF
60
PIN-PD
58
GVD MONITOR
54
52
MONITOR SIGNAL
λi
λ2n+1
λ2n
66
64
68
λ4n+1
70
72
λ4n+3
λ4n+2
74
76
λ4n
OPTICAL DEMULTIPLEXER
44
92
20
OPTICAL RECEIVER #1
OPTICAL RECEIVER #41
OPTICAL RECEIVER #3
OPTICAL RECEIVER #43
OPTICAL RECEIVER #2
OPTICAL RECEIVER #42
OPTICAL RECEIVER #4
OPTICAL RECEIVER #44

FIG. 11


4
RECEIVING TERMINAL UNIT
44
OPTICAL DEMULTIPLEXER
20
40
42
6;OPTICAL FIBER TRANSMISSION LINE
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
VARIABLE DISPERSION COMPENSATOR
46
100-G VARIABLE DISPERSION COMPENSATOR
56
CONTROL CIRCUIT
22
24
OPTICAL PREAMPLIFIER
18
66
64
68
70
72
74
76
λ 4n+1
λ 2n+1
λ 4n+3
λ 4n+2
λ 2n
λ 4n
OPTICAL RECEIVER #1
OPTICAL RECEIVER #41
OPTICAL RECEIVER #3
OPTICAL RECEIVER #43
OPTICAL RECEIVER #2
OPTICAL RECEIVER #42
OPTICAL RECEIVER #4
OPTICAL RECEIVER #44
MONITOR SIGNAL

Translation of 98-2178

FIG. 12

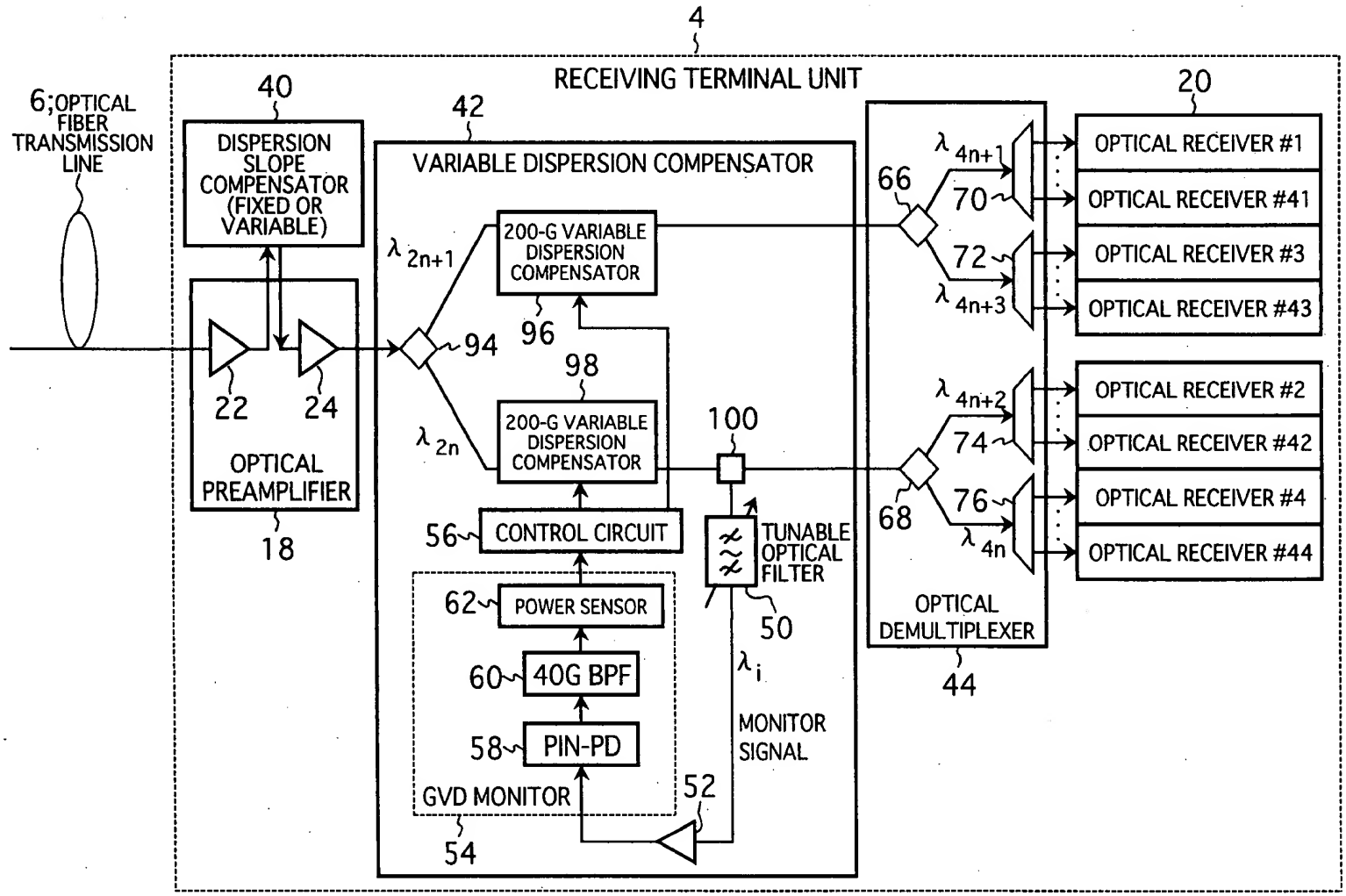
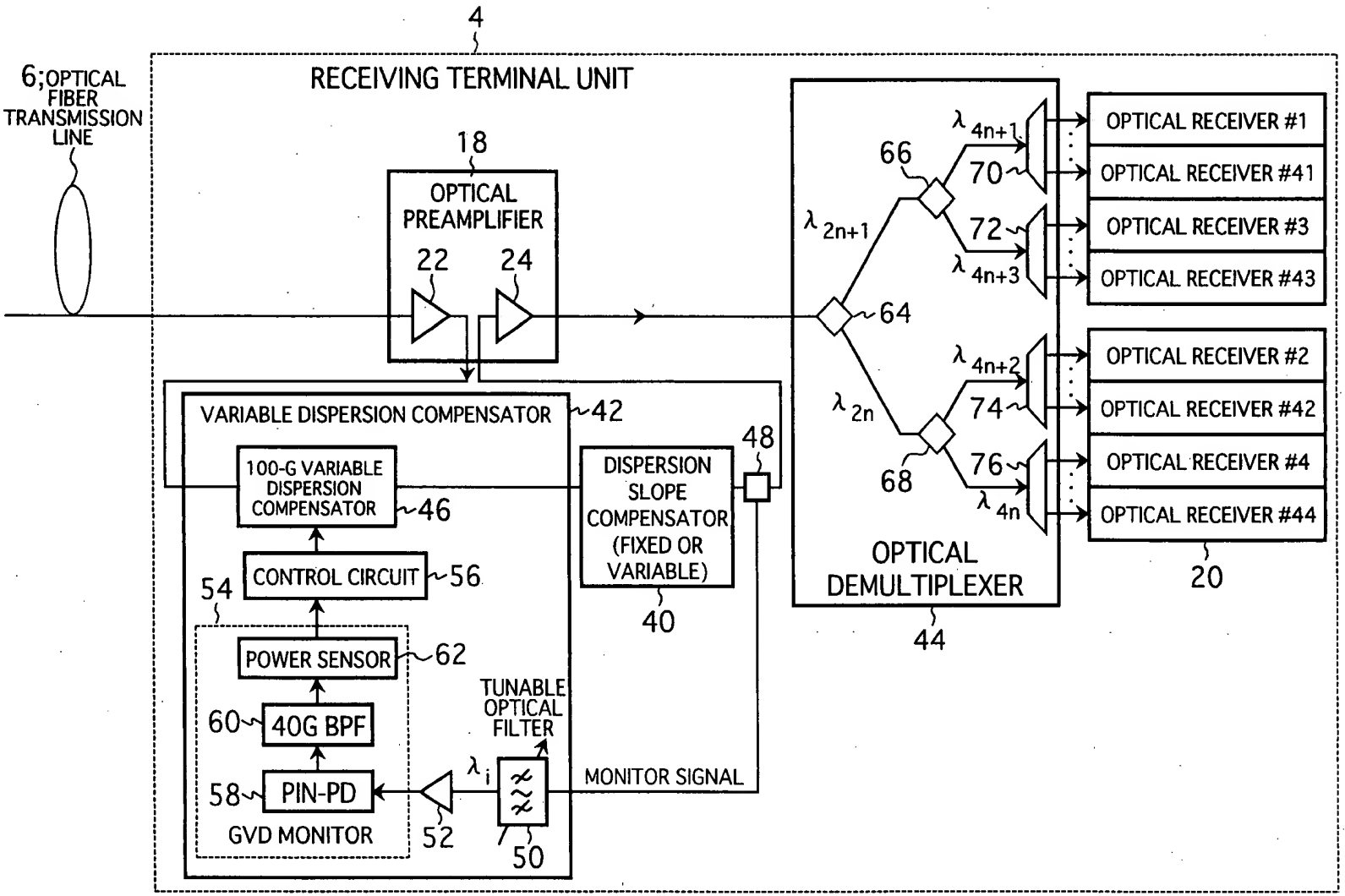


FIG. 13


4
RECEIVING TERMINAL UNIT
6;OPTICAL FIBER TRANSMISSION LINE
18
OPTICAL PREAMPLIFIER
22
24
VARIABLE DISPERSION COMPENSATOR
42
100-G VARIABLE DISPERSION COMPENSATOR
46
CONTROL CIRCUIT
56
54
POWER SENSOR
62
60
40G BPF
58
PIN-PD
GVD MONITOR
52
TUNABLE OPTICAL FILTER
50
MONITOR SIGNAL
48
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
40
66
64
68
70
72
74
76
OPTICAL DEMULTIPLEXER
44
OPTICAL RECEIVER #1
OPTICAL RECEIVER #41
OPTICAL RECEIVER #3
OPTICAL RECEIVER #43
OPTICAL RECEIVER #2
OPTICAL RECEIVER #42
OPTICAL RECEIVER #4
OPTICAL RECEIVER #44
20

F I G. 1 4

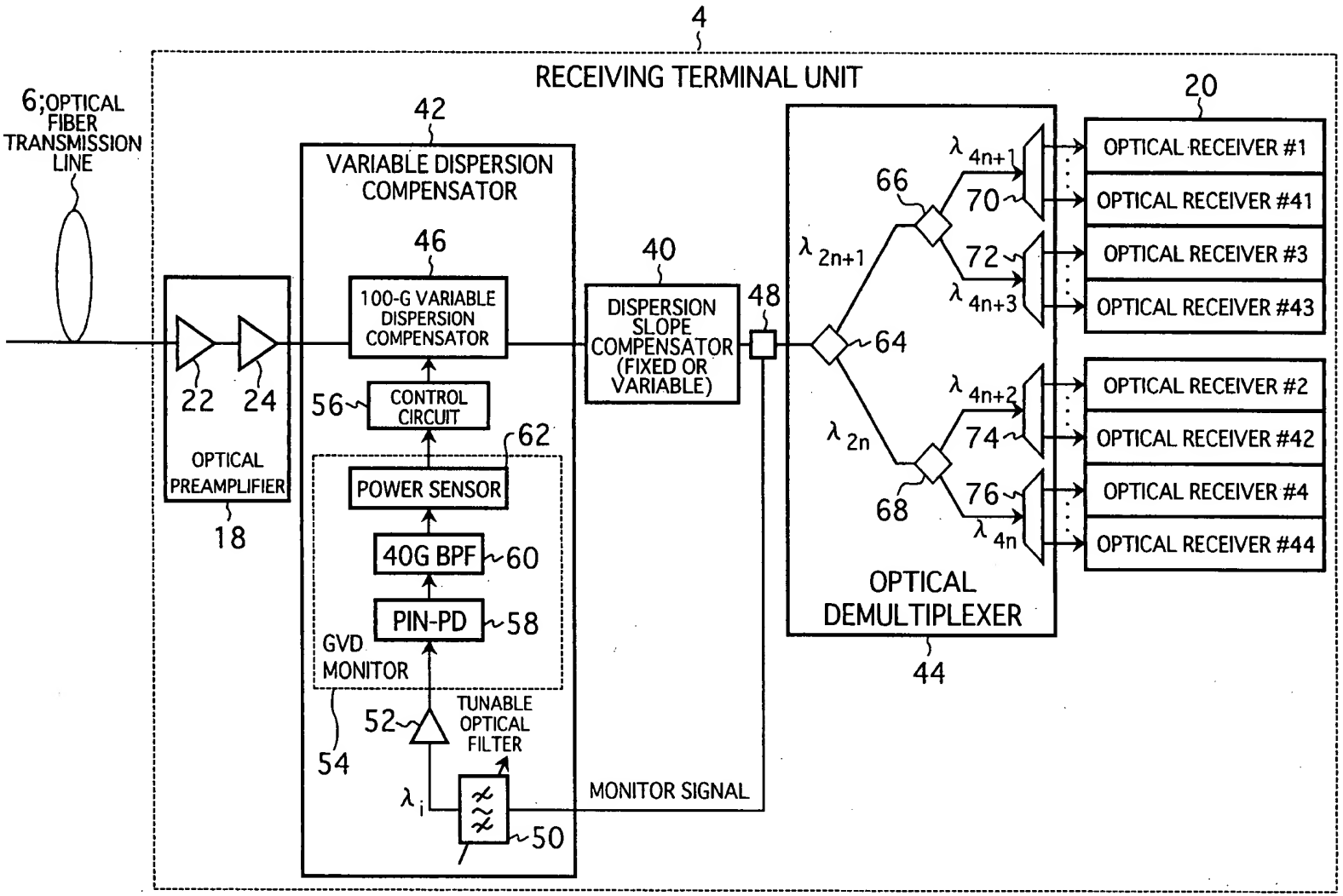

4
RECEIVING TERMINAL UNIT
6;OPTICAL FIBER TRANSMISSION LINE
42
VARIABLE DISPERSION COMPENSATOR
46
100-G VARIABLE DISPERSION COMPENSATOR
40
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
48
22
24
OPTICAL PREAMPLIFIER
18
56
CONTROL CIRCUIT
62
POWER SENSOR
40G BPF
60
PIN-PD
58
GVD MONITOR
54
52
TUNABLE OPTICAL FILTER
λi
50
MONITOR SIGNAL
λ 2n+1
λ 2n
66
64
68
λ 4n+1
70
72
λ 4n+3
λ 4n+2
74
76
λ 4n
OPTICAL DEMULTIPLEXER
44
20
OPTICAL RECEIVER #1
OPTICAL RECEIVER #41
OPTICAL RECEIVER #3
OPTICAL RECEIVER #43
OPTICAL RECEIVER #2
OPTICAL RECEIVER #42
OPTICAL RECEIVER #4
OPTICAL RECEIVER #44

FIG. 15

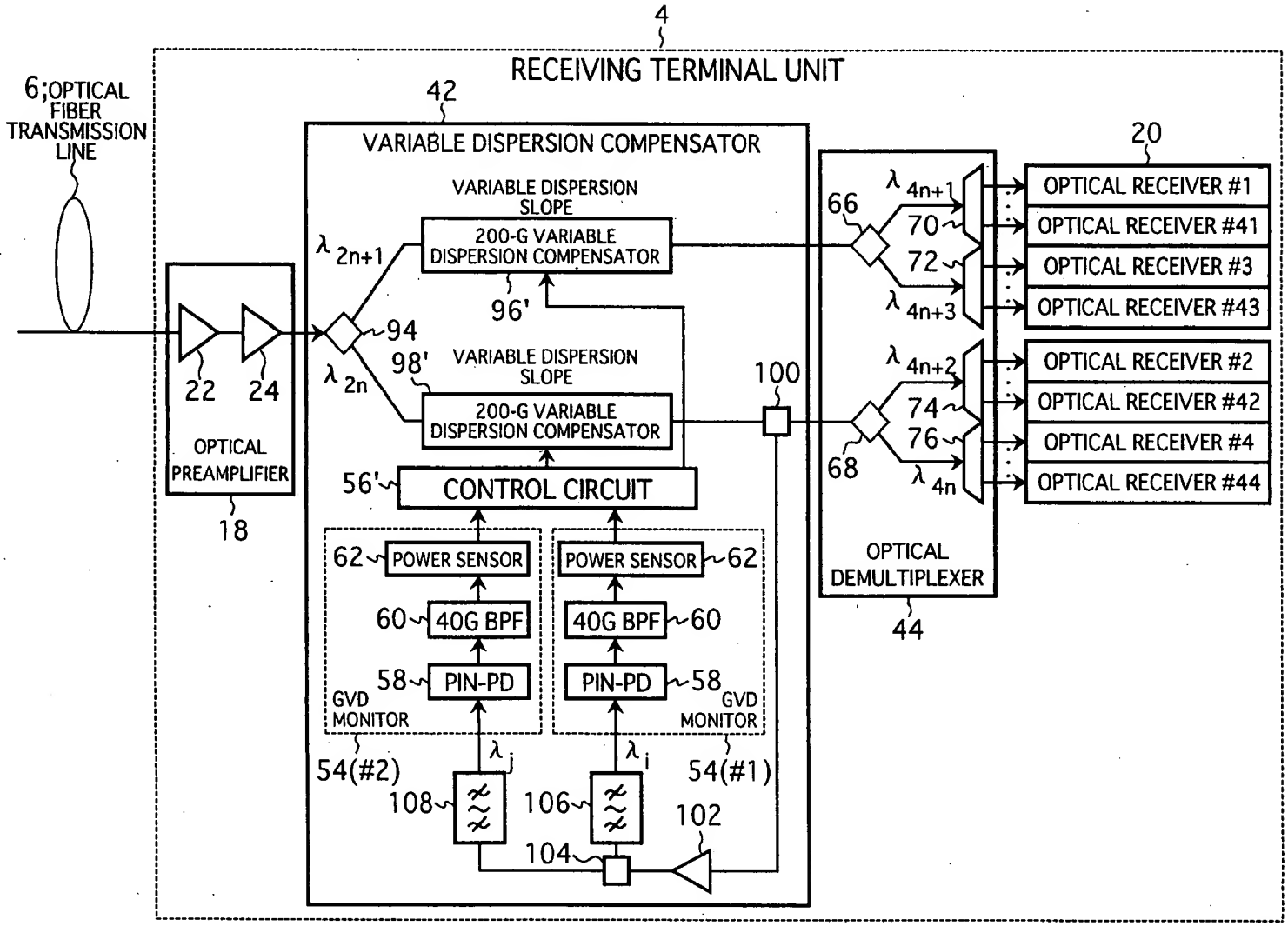

4
RECEIVING TERMINAL UNIT
6;OPTICAL FIBER TRANSMISSION LINE
42
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION SLOPE
200-G VARIABLE DISPERSION COMPENSATOR
96'
λ 2n+1
94
98'
λ 2n
VARIABLE DISPERSION SLOPE
200-G VARIABLE DISPERSION COMPENSATOR
22
24
OPTICAL PREAMPLIFIER
18
56'
CONTROL CIRCUIT
62
POWER SENSOR
60
40G BPF
58
PIN-PD
GVD MONITOR
54(#2)
λ j
108
106
λ i
54(#1)
102
104
100
66
λ 4n+1
70
72
λ 4n+3
λ 4n+2
74
76
68
λ 4n
OPTICAL DEMULTIPLEXER
44
20
OPTICAL RECEIVER #1
OPTICAL RECEIVER #41
OPTICAL RECEIVER #3
OPTICAL RECEIVER #43
OPTICAL RECEIVER #2
OPTICAL RECEIVER #42
OPTICAL RECEIVER #4
OPTICAL RECEIVER #44

FIG. 16

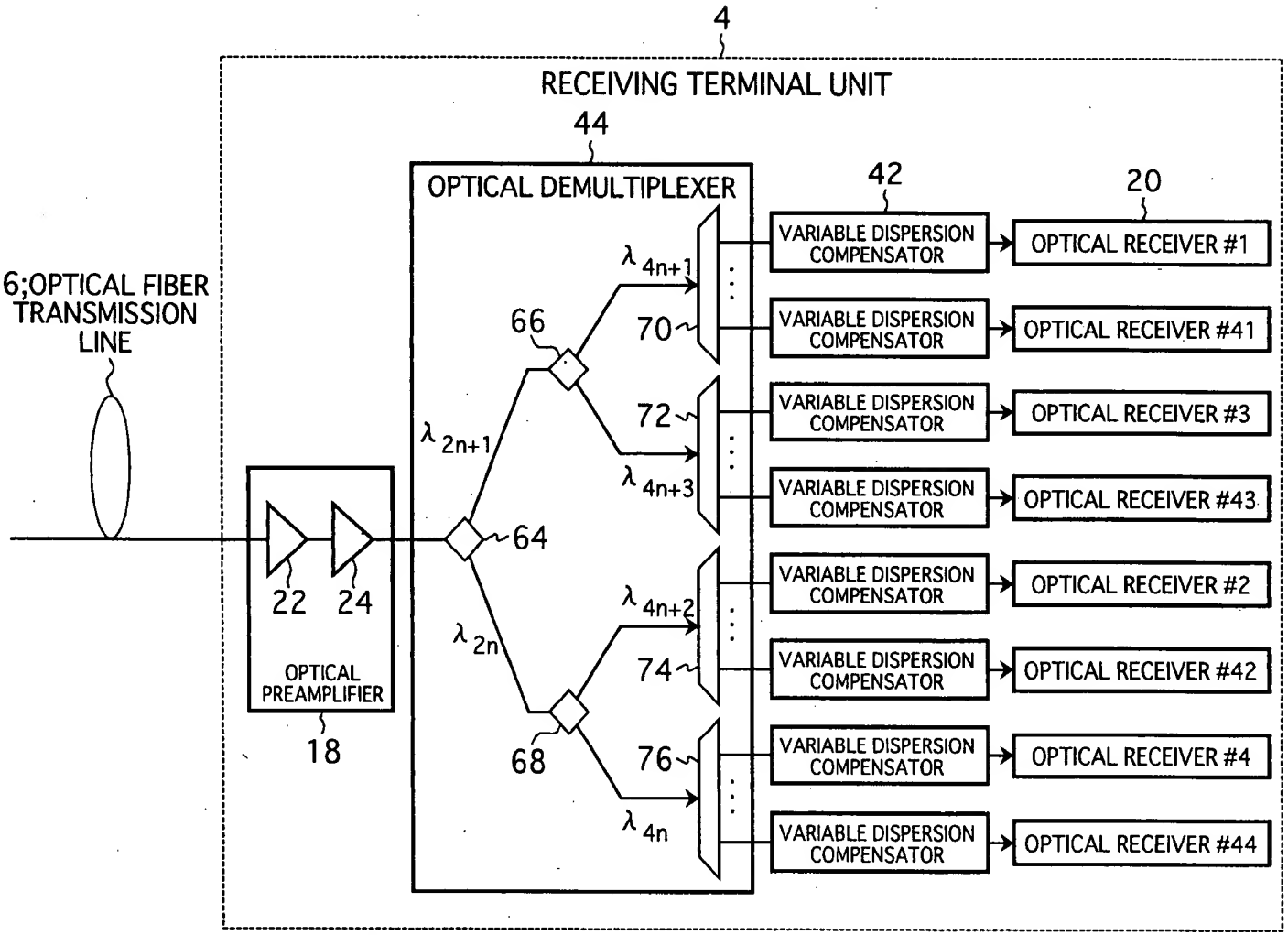

4
RECEIVING TERMINAL UNIT
44
OPTICAL DEMULTIPLEXER
42
20
6;OPTICAL FIBER TRANSMISSION LINE
22
24
OPTICAL PREAMPLIFIER
18
64
66
68
70
72
74
76
λ 2n+1
λ 2n
λ 4n+1
λ 4n+3
λ 4n+2
λ 4n
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
OPTICAL RECEIVER #1
OPTICAL RECEIVER #41
OPTICAL RECEIVER #3
OPTICAL RECEIVER #43
OPTICAL RECEIVER #2
OPTICAL RECEIVER #42
OPTICAL RECEIVER #4
OPTICAL RECEIVER #44

FIG. 17

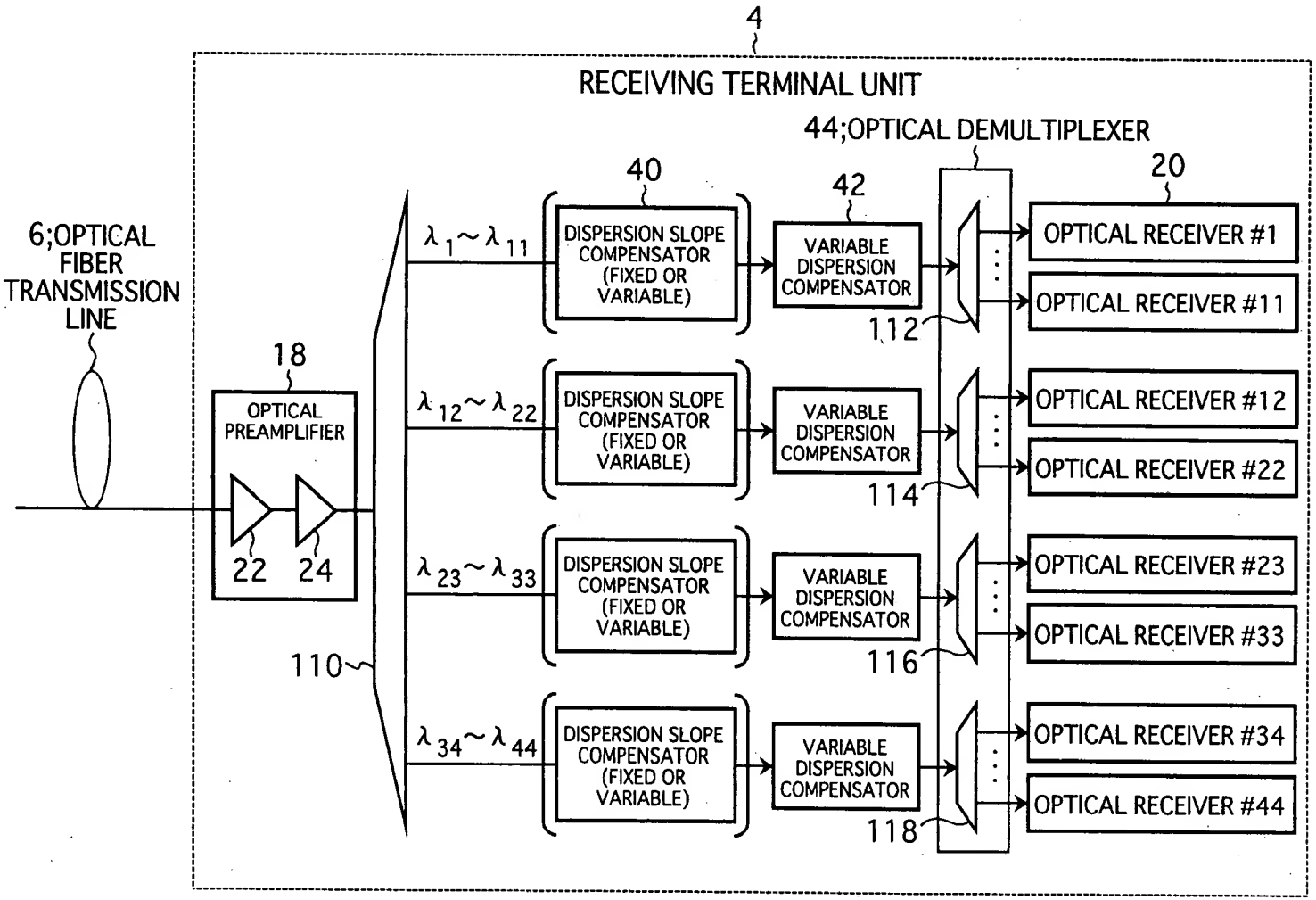

4
RECEIVING TERMINAL UNIT
44;OPTICAL DEMULTIPLEXER
6;OPTICAL FIBER TRANSMISSION LINE
18
OPTICAL PREAMPLIFIER
22
24
110
40
42
20
λ1~λ11
λ12~λ22
λ23~λ33
λ34~λ44
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
VARIABLE DISPERSION COMPENSATOR
112
114
116
118
OPTICAL RECEIVER #1
OPTICAL RECEIVER #11
OPTICAL RECEIVER #12
OPTICAL RECEIVER #22
OPTICAL RECEIVER #23
OPTICAL RECEIVER #33
OPTICAL RECEIVER #34
OPTICAL RECEIVER #44

FIG. 18

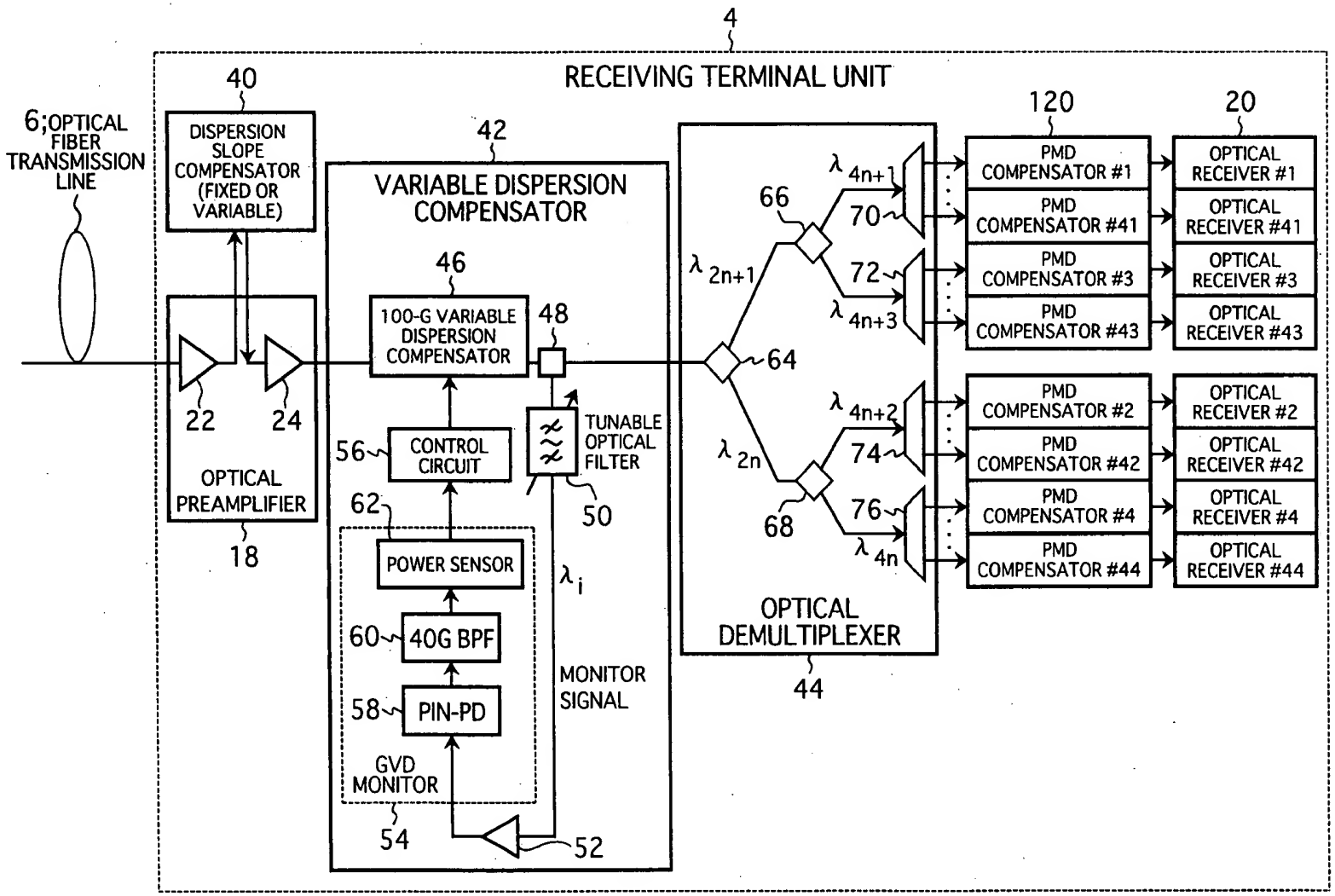

4
RECEIVING TERMINAL UNIT
6;OPTICAL FIBER TRANSMISSION LINE
40
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
42
VARIABLE DISPERSION COMPENSATOR
46
100-G VARIABLE DISPERSION COMPENSATOR
48
22
24
OPTICAL PREAMPLIFIER
18
56
CONTROL CIRCUIT
TUNABLE OPTICAL FILTER
50
62
POWER SENSOR
60
40G BPF
58
PIN-PD
GVD MONITOR
54
52
MONITOR SIGNAL
λi
λ2n+1
λ2n
66
64
68
λ4n+1
70
72
λ4n+3
λ4n+2
74
76
λ4n
OPTICAL DEMULTIPLEXER
44
120
PMD COMPENSATOR #1
PMD COMPENSATOR #41
PMD COMPENSATOR #3
PMD COMPENSATOR #43
PMD COMPENSATOR #2
PMD COMPENSATOR #42
PMD COMPENSATOR #4
PMD COMPENSATOR #44
20
OPTICAL RECEIVER #1
OPTICAL RECEIVER #41
OPTICAL RECEIVER #3
OPTICAL RECEIVER #43
OPTICAL RECEIVER #2
OPTICAL RECEIVER #42
OPTICAL RECEIVER #4
OPTICAL RECEIVER #44

FIG. 19

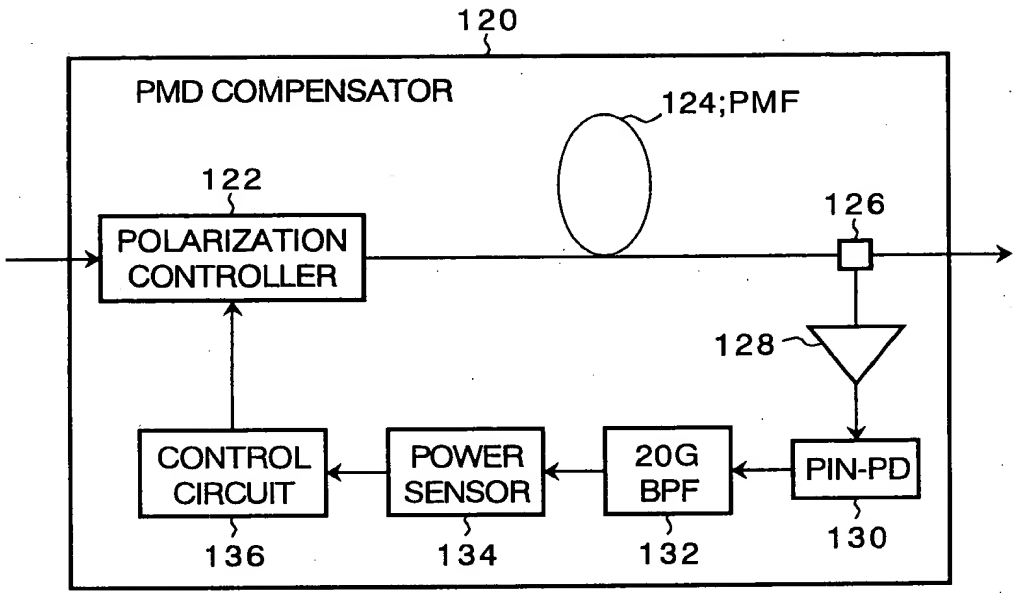

120
PMD COMPENSATOR
124;PMF
122
126
POLARIZATION CONTROLLER
128
CONTROL CIRCUIT
POWER SENSOR
20G BPF
PIN-PD
136
134
132
130

FIG. 20

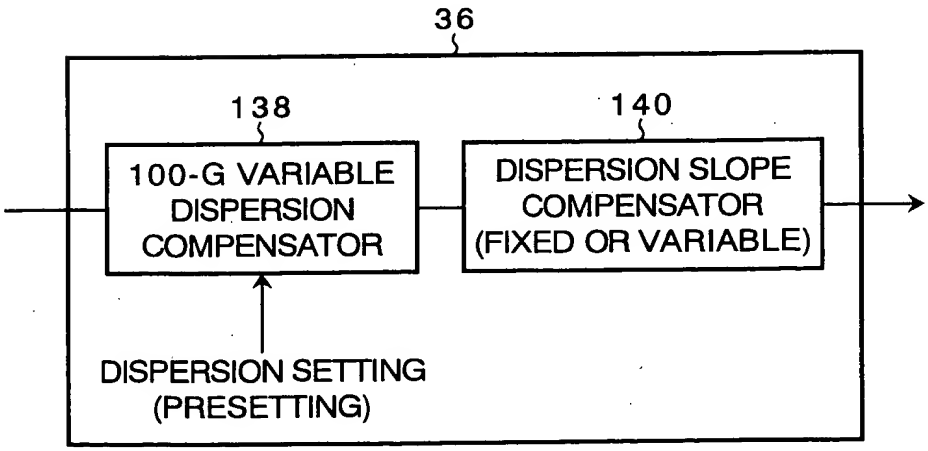

36
138
140
100-G VARIABLE DISPERSION COMPENSATOR
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
DISPERSION SETTING (PRESETTING)

FIG. 21

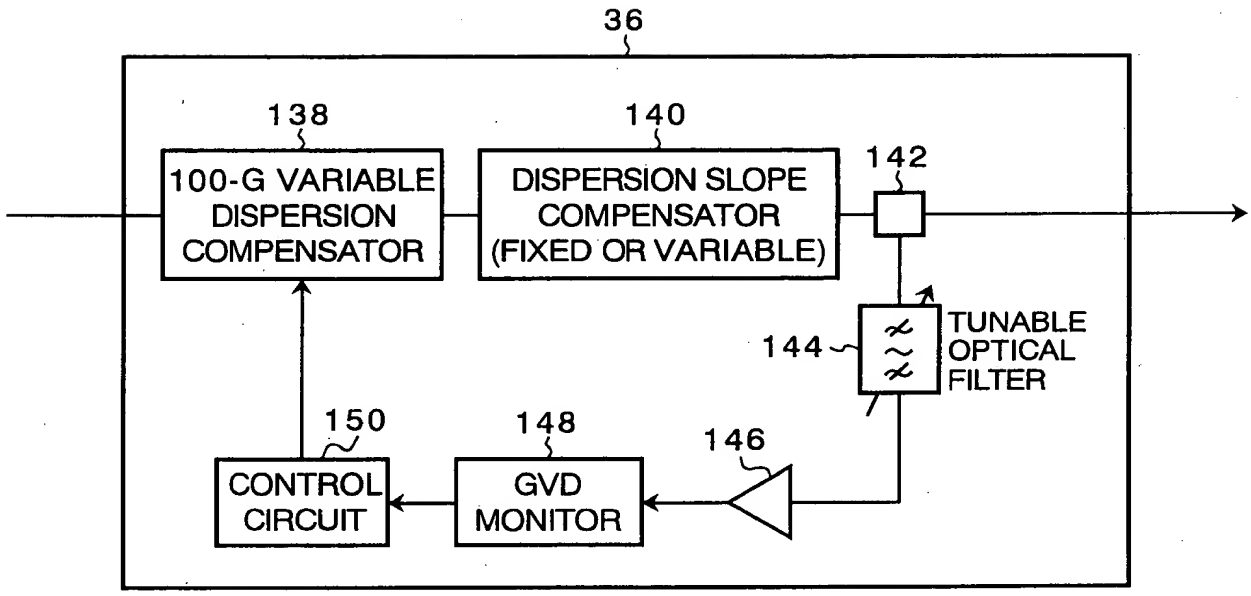

36
138
140
142
100-G VARIABLE DISPERSION COMPENSATOR
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
144
TUNABLE OPTICAL FILTER
150
148
146
CONTROL CIRCUIT
GVD MONITOR

FIG. 22

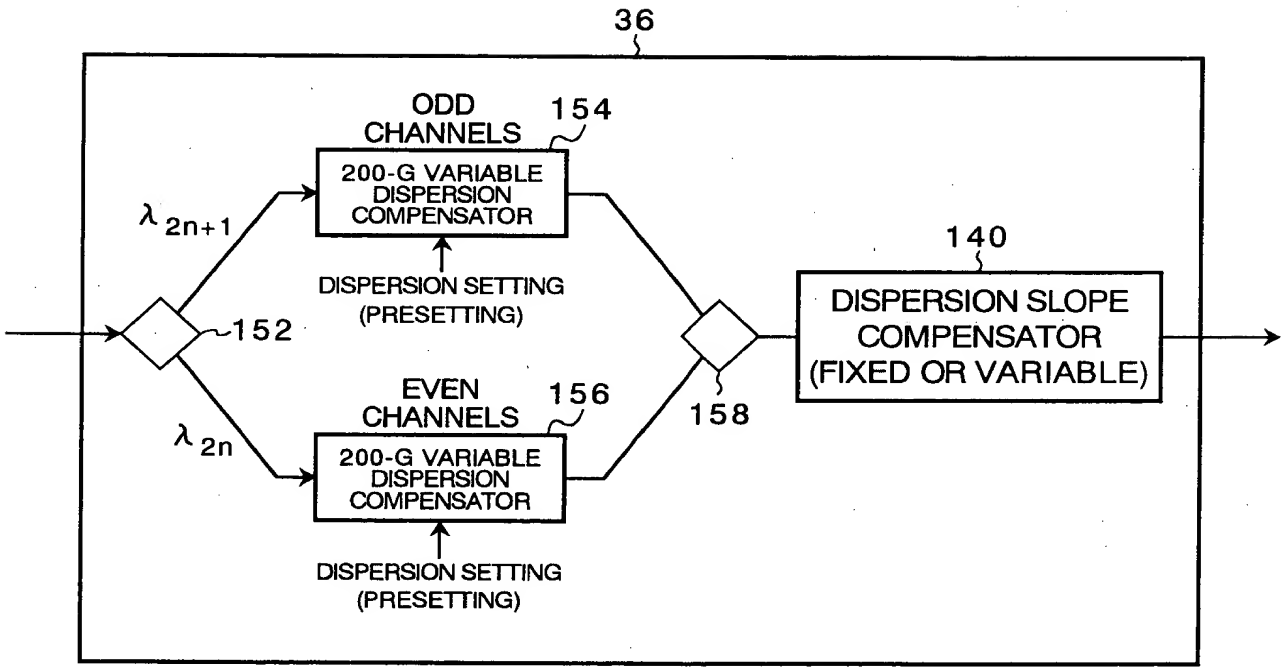

36
ODD CHANNELS
154
200-G VARIABLE DISPERSION COMPENSATOR
λ 2n+1
DISPERSION SETTING (PRESETTING)
152
EVEN CHANNELS
156
λ 2n
200-G VARIABLE DISPERSION COMPENSATOR
DISPERSION SETTING (PRESETTING)
158
140
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)

FIG. 23

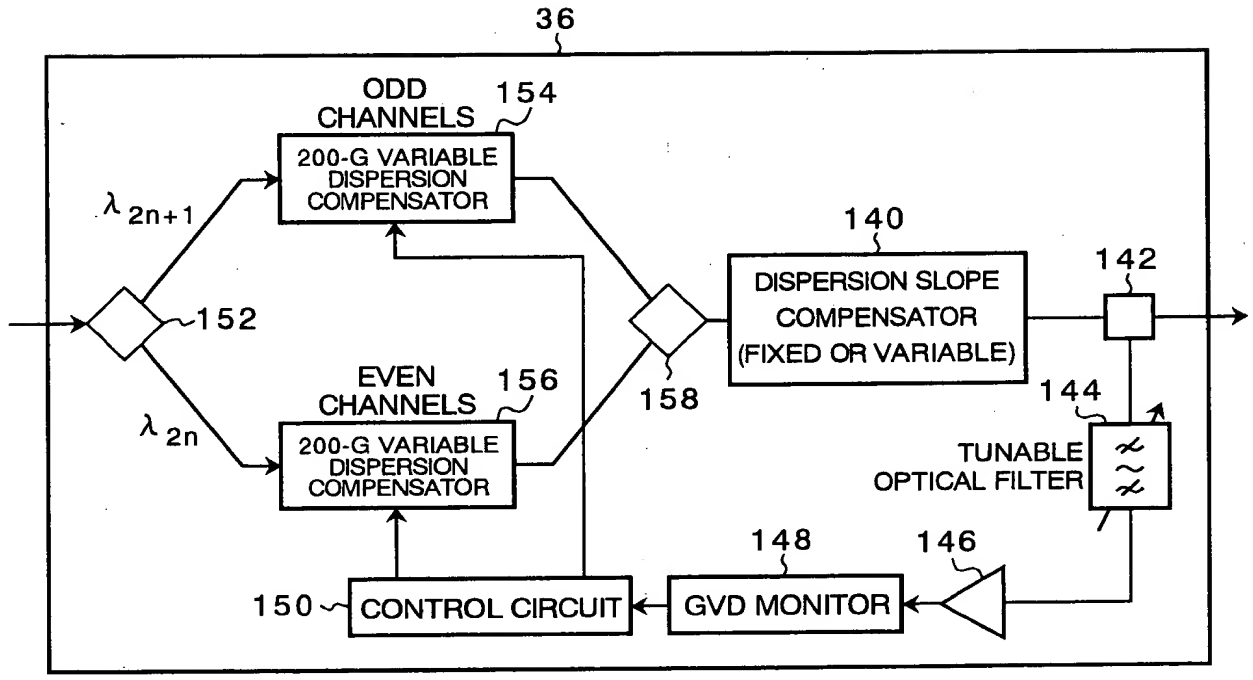

36
ODD CHANNELS
154
200-G VARIABLE DISPERSION COMPENSATOR
λ 2n+1
152
EVEN CHANNELS
156
200-G VARIABLE DISPERSION COMPENSATOR
λ 2n
158
140
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
142
144
TUNABLE OPTICAL FILTER
148
146
150
CONTROL CIRCUIT
GVD MONITOR

FIG. 24

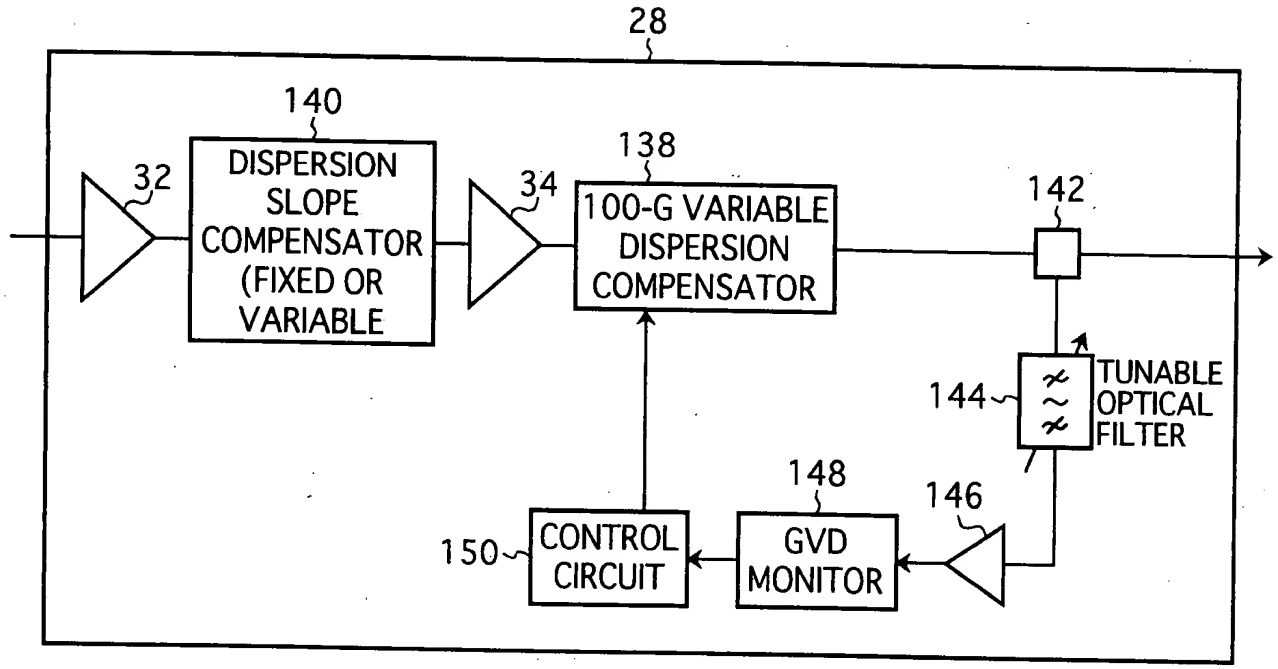

28
140
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE
32
34
138
100-G VARIABLE DISPERSION COMPENSATOR
142
144
TUNABLE OPTICAL FILTER
148
146
150
CONTROL CIRCUIT
GVD MONITOR

FIG. 25

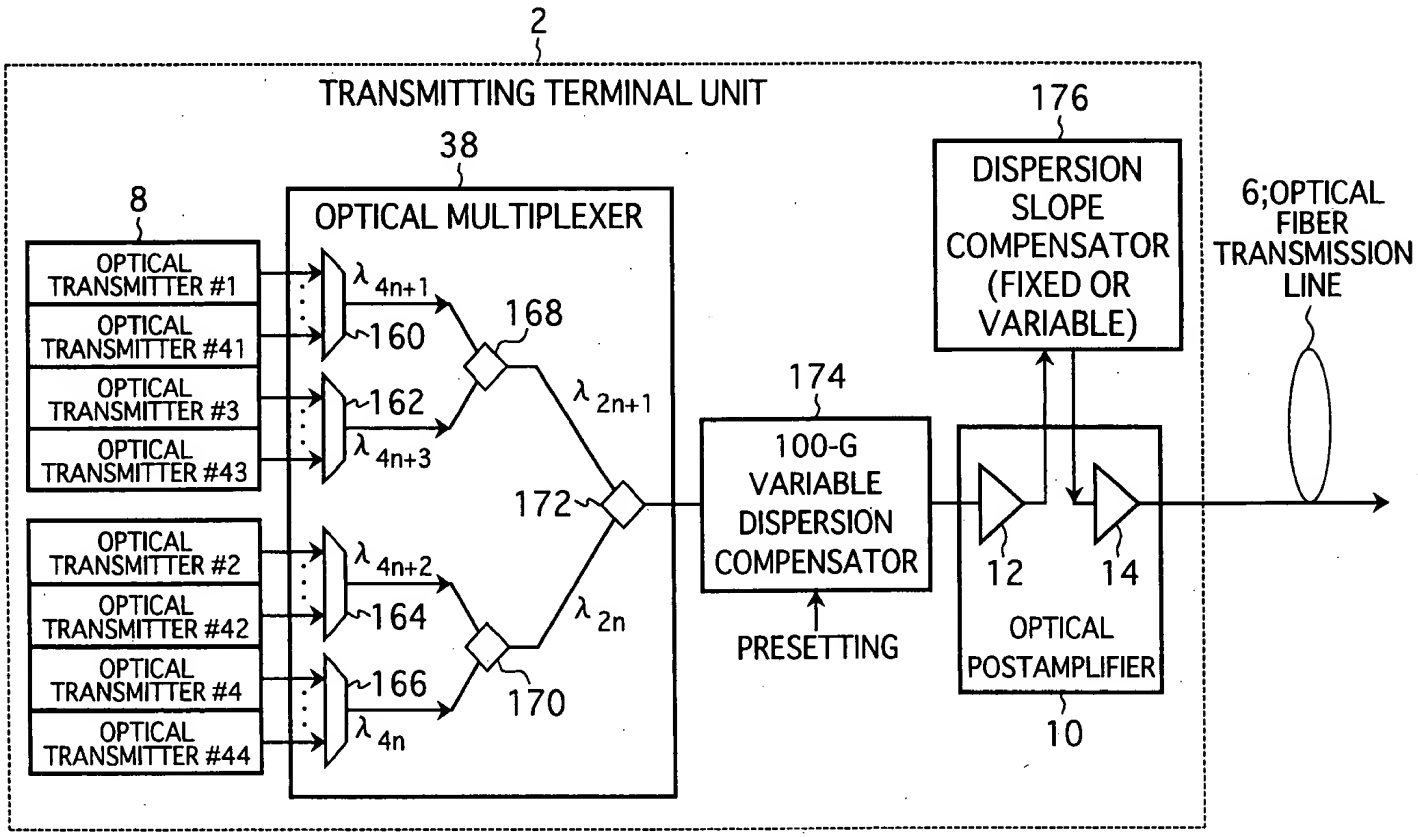

2
TRANSMITTING TERMINAL UNIT
38
OPTICAL MULTIPLEXER
8
OPTICAL TRANSMITTER #1
OPTICAL TRANSMITTER #41
OPTICAL TRANSMITTER #3
OPTICAL TRANSMITTER #43
OPTICAL TRANSMITTER #2
OPTICAL TRANSMITTER #42
OPTICAL TRANSMITTER #4
OPTICAL TRANSMITTER #44
λ 4n+1
160
162
λ 4n+3
λ 4n+2
164
166
λ 4n
168
λ 2n+1
172
λ 2n
170
174
100-G VARIABLE DISPERSION COMPENSATOR
PRESETTING
176
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
12
14
OPTICAL POSTAMPLIFIER
10
6;OPTICAL FIBER TRANSMISSION LINE

FIG. 26

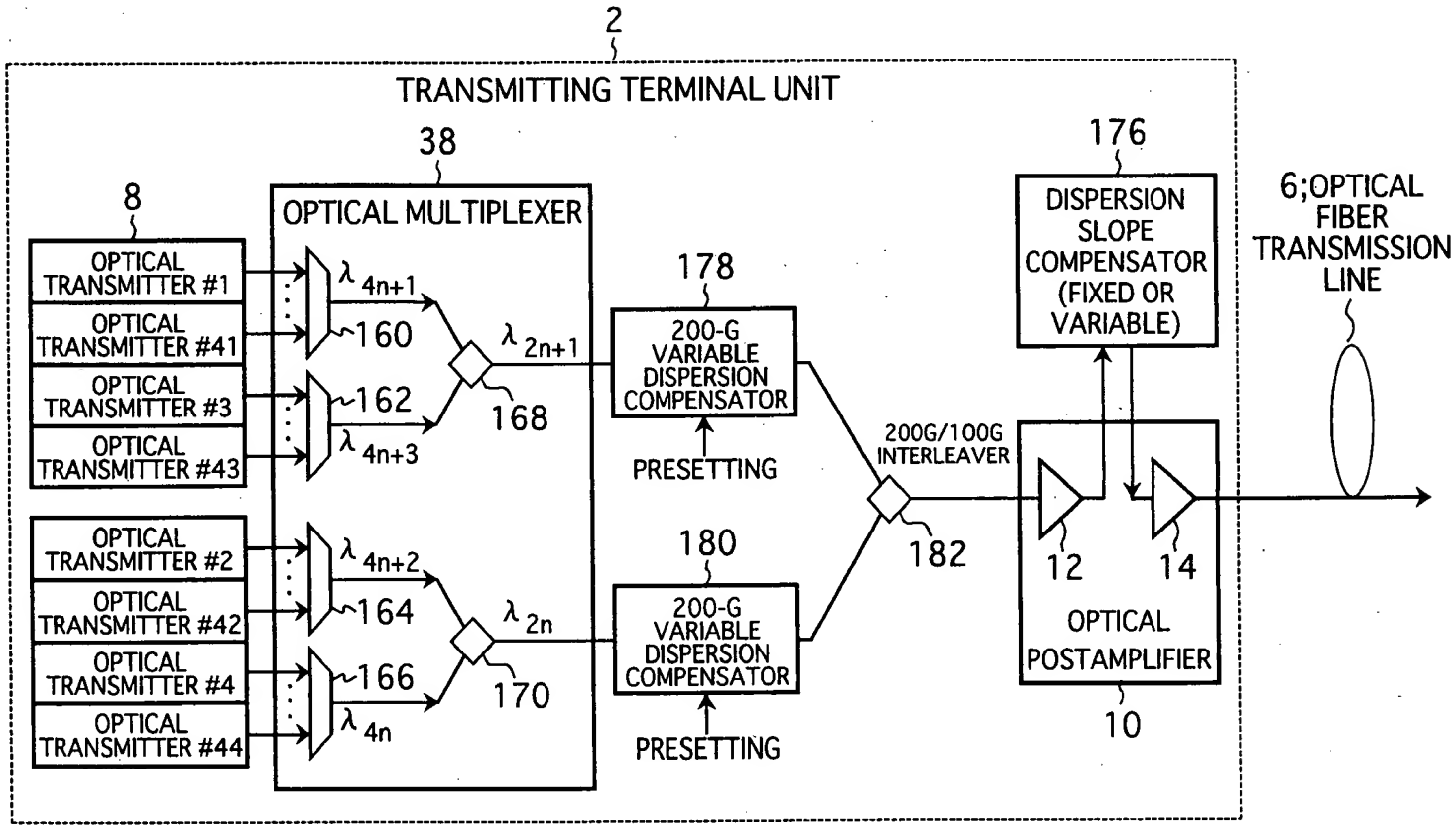
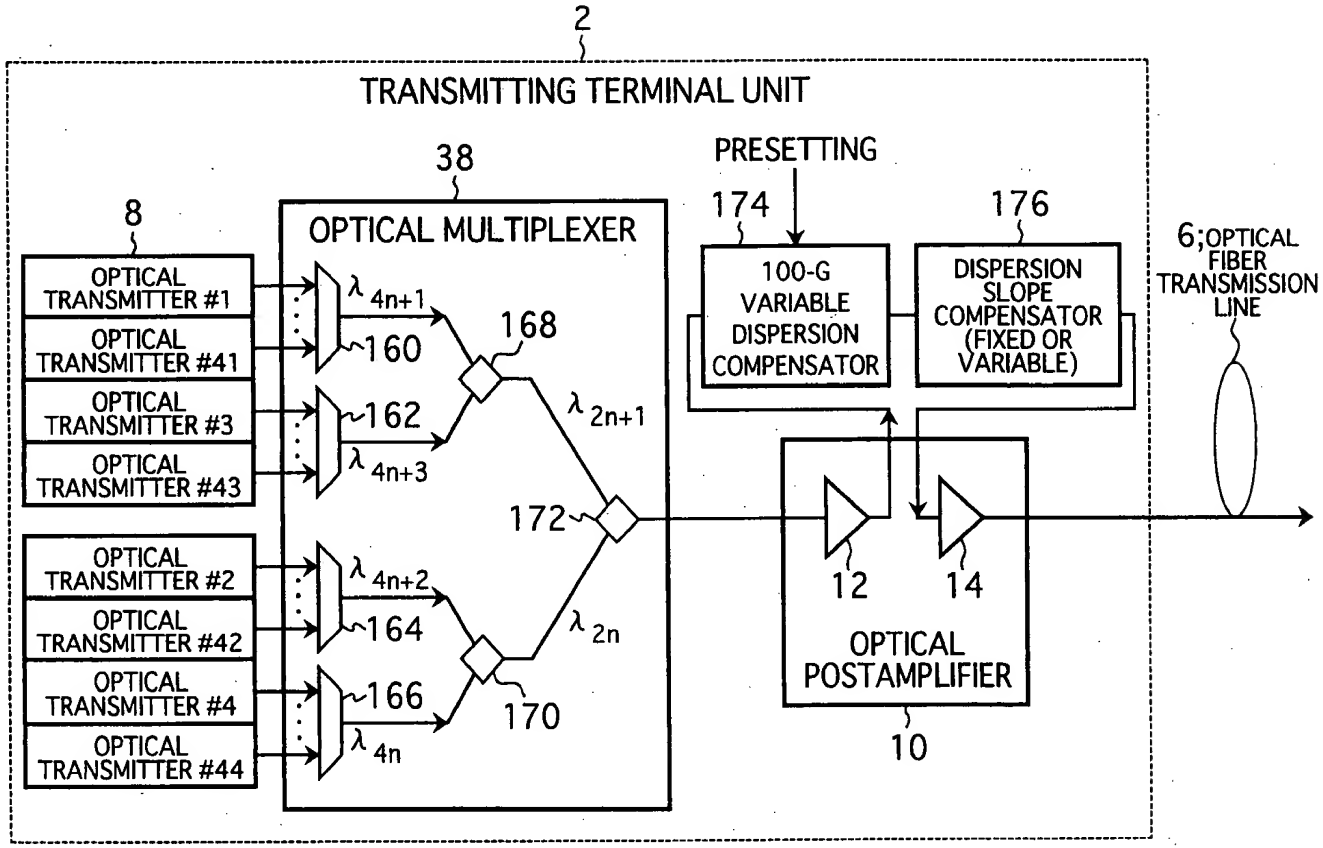

2
TRANSMITTING TERMINAL UNIT
38
OPTICAL MULTIPLEXER
8
OPTICAL TRANSMITTER #1
OPTICAL TRANSMITTER #41
OPTICAL TRANSMITTER #3
OPTICAL TRANSMITTER #43
OPTICAL TRANSMITTER #2
OPTICAL TRANSMITTER #42
OPTICAL TRANSMITTER #4
OPTICAL TRANSMITTER #44
λ 4n+1
160
162
λ 4n+3
λ 2n+1
168
λ 4n+2
164
166
λ 4n
λ 2n
170
178
200-G VARIABLE DISPERSION COMPENSATOR
PRESETTING
180
200-G VARIABLE DISPERSION COMPENSATOR
PRESETTING
200G/100G INTERLEAVER
182
176
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
12
14
OPTICAL POSTAMPLIFIER
10
6;OPTICAL FIBER TRANSMISSION LINE

FIG. 27


2
TRANSMITTING TERMINAL UNIT
38
OPTICAL MULTIPLEXER
8
OPTICAL TRANSMITTER #1
OPTICAL TRANSMITTER #41
OPTICAL TRANSMITTER #3
OPTICAL TRANSMITTER #43
OPTICAL TRANSMITTER #2
OPTICAL TRANSMITTER #42
OPTICAL TRANSMITTER #4
OPTICAL TRANSMITTER #44
λ 4n+1
160
162
λ 4n+3
λ 4n+2
164
166
λ 4n
168
170
172
λ 2n+1
λ 2n
PRESETTING
174
100-G VARIABLE DISPERSION COMPENSATOR
176
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
12
14
OPTICAL POSTAMPLIFIER
10
6;OPTICAL FIBER TRANSMISSION LINE

Translation Services

FIG. 28

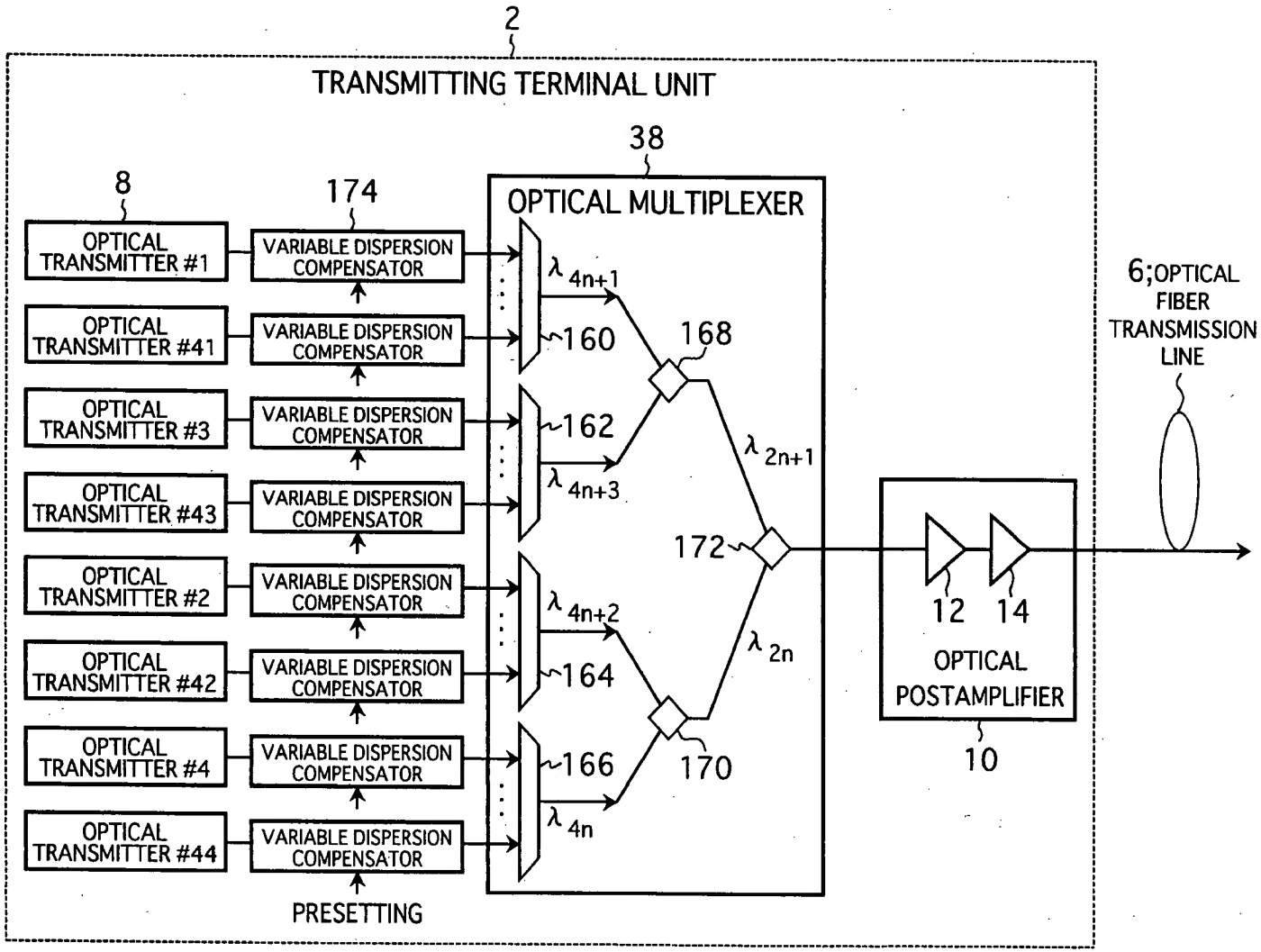


FIG. 29

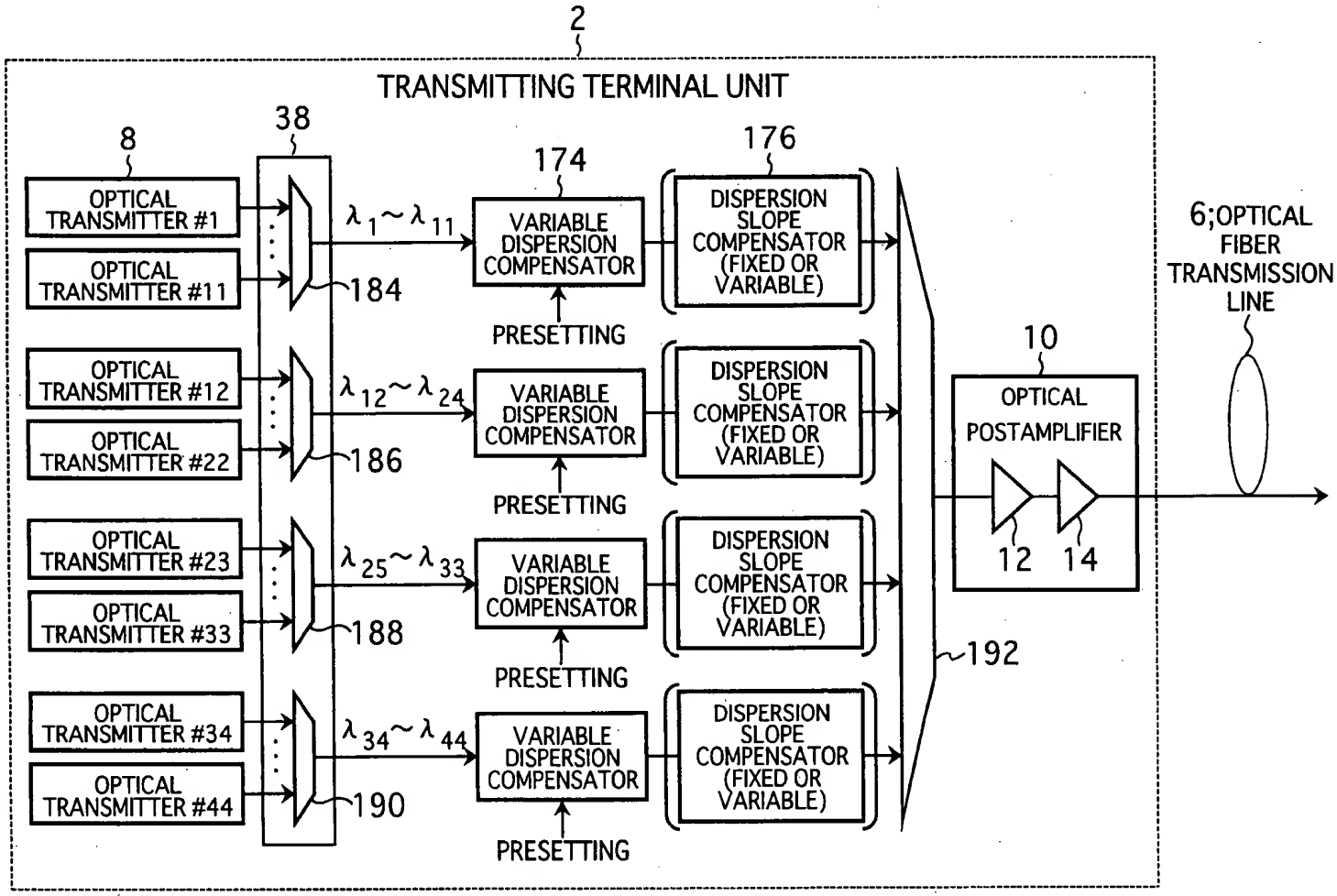
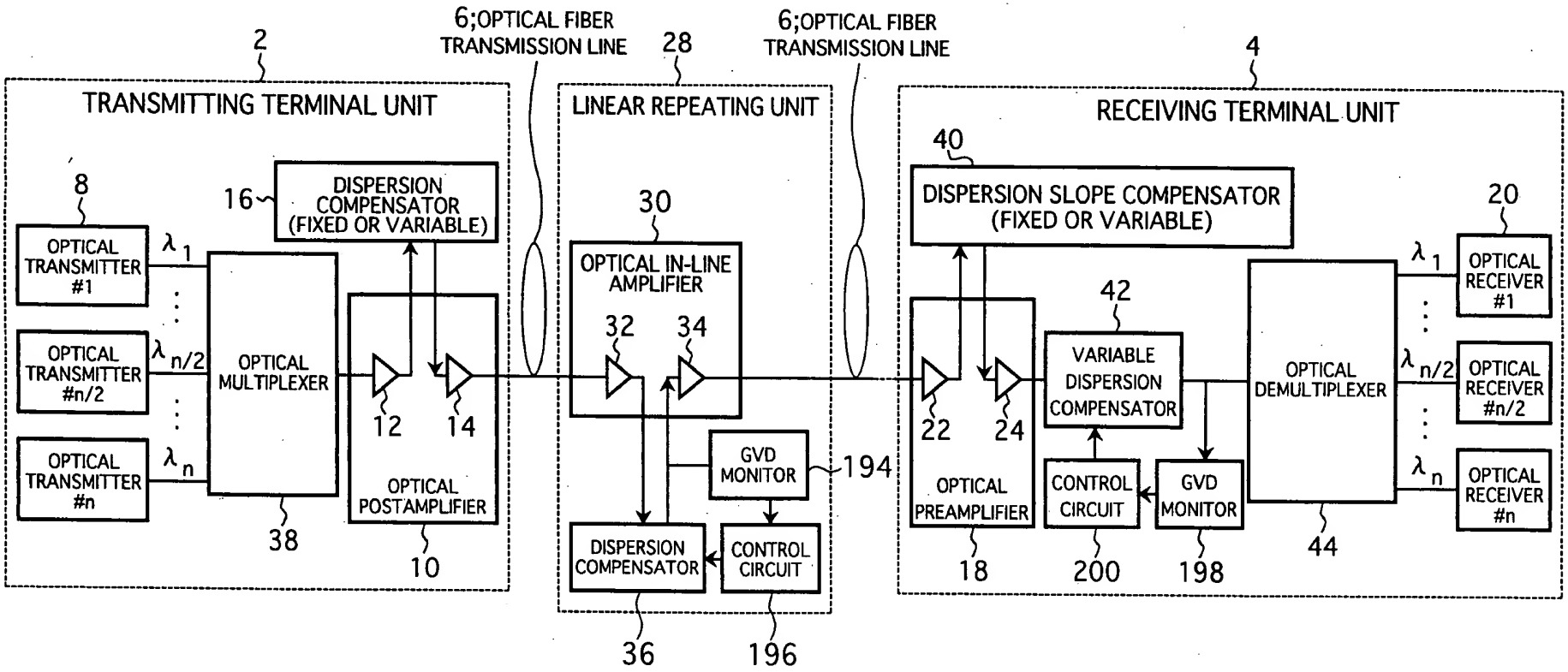

2
TRANSMITTING TERMINAL UNIT
8
38
174
176
OPTICAL TRANSMITTER #1
OPTICAL TRANSMITTER #11
OPTICAL TRANSMITTER #12
OPTICAL TRANSMITTER #22
OPTICAL TRANSMITTER #23
OPTICAL TRANSMITTER #33
OPTICAL TRANSMITTER #34
OPTICAL TRANSMITTER #44
λ1~λ11
λ12~λ24
λ25~λ33
λ34~λ44
184
186
188
190
VARIABLE DISPERSION COMPENSATOR
PRESETTING
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
192
10
OPTICAL POSTAMPLIFIER
12
14
6;OPTICAL FIBER TRANSMISSION LINE

FIG. 30


2
TRANSMITTING TERMINAL UNIT
8
OPTICAL TRANSMITTER #1
OPTICAL TRANSMITTER #n/2
OPTICAL TRANSMITTER #n
λ 1
λ n/2
λ n
OPTICAL MULTIPLEXER
38
16
DISPERSION COMPENSATOR (FIXED OR VARIABLE)
12
14
OPTICAL POSTAMPLIFIER
10
6;OPTICAL FIBER TRANSMISSION LINE
28
LINEAR REPEATING UNIT
30
OPTICAL IN-LINE AMPLIFIER
32
34
GVD MONITOR
194
DISPERSION COMPENSATOR
CONTROL CIRCUIT
36
196
6;OPTICAL FIBER TRANSMISSION LINE
4
RECEIVING TERMINAL UNIT
40
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
22
24
OPTICAL PREAMPLIFIER
18
42
VARIABLE DISPERSION COMPENSATOR
CONTROL CIRCUIT
200
GVD MONITOR
198
OPTICAL DEMULTIPLEXER
44
20
λ 1
λ n/2
λ n
OPTICAL RECEIVER #1
OPTICAL RECEIVER #n/2
OPTICAL RECEIVER #n

F I G. 3 1

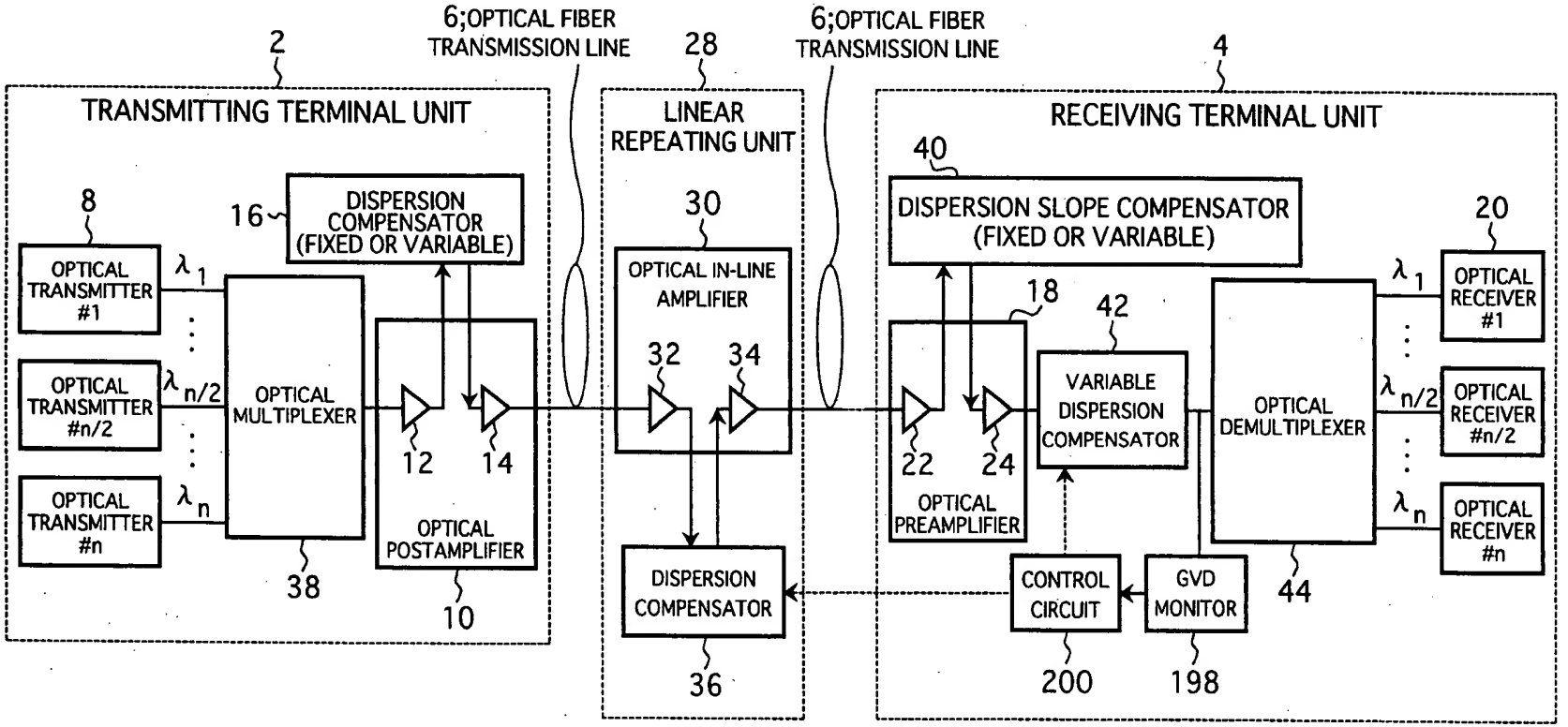

2
6;OPTICAL FIBER TRANSMISSION LINE
28
6;OPTICAL FIBER TRANSMISSION LINE
4
TRANSMITTING TERMINAL UNIT
LINEAR REPEATING UNIT
RECEIVING TERMINAL UNIT
8
16
DISPERSION COMPENSATOR (FIXED OR VARIABLE)
30
40
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
20
OPTICAL TRANSMITTER #1
λ1
OPTICAL TRANSMITTER #n/2
λn/2
OPTICAL TRANSMITTER #n
λn
OPTICAL MULTIPLEXER
38
12
14
OPTICAL POSTAMPLIFIER
10
OPTICAL IN-LINE AMPLIFIER
32
34
DISPERSION COMPENSATOR
36
18
42
22
24
OPTICAL PREAMPLIFIER
VARIABLE DISPERSION COMPENSATOR
OPTICAL DEMULTIPLEXER
44
CONTROL CIRCUIT
200
GVD MONITOR
198
λ1
OPTICAL RECEIVER #1
λn/2
OPTICAL RECEIVER #n/2
λn
OPTICAL RECEIVER #n

FIG. 32

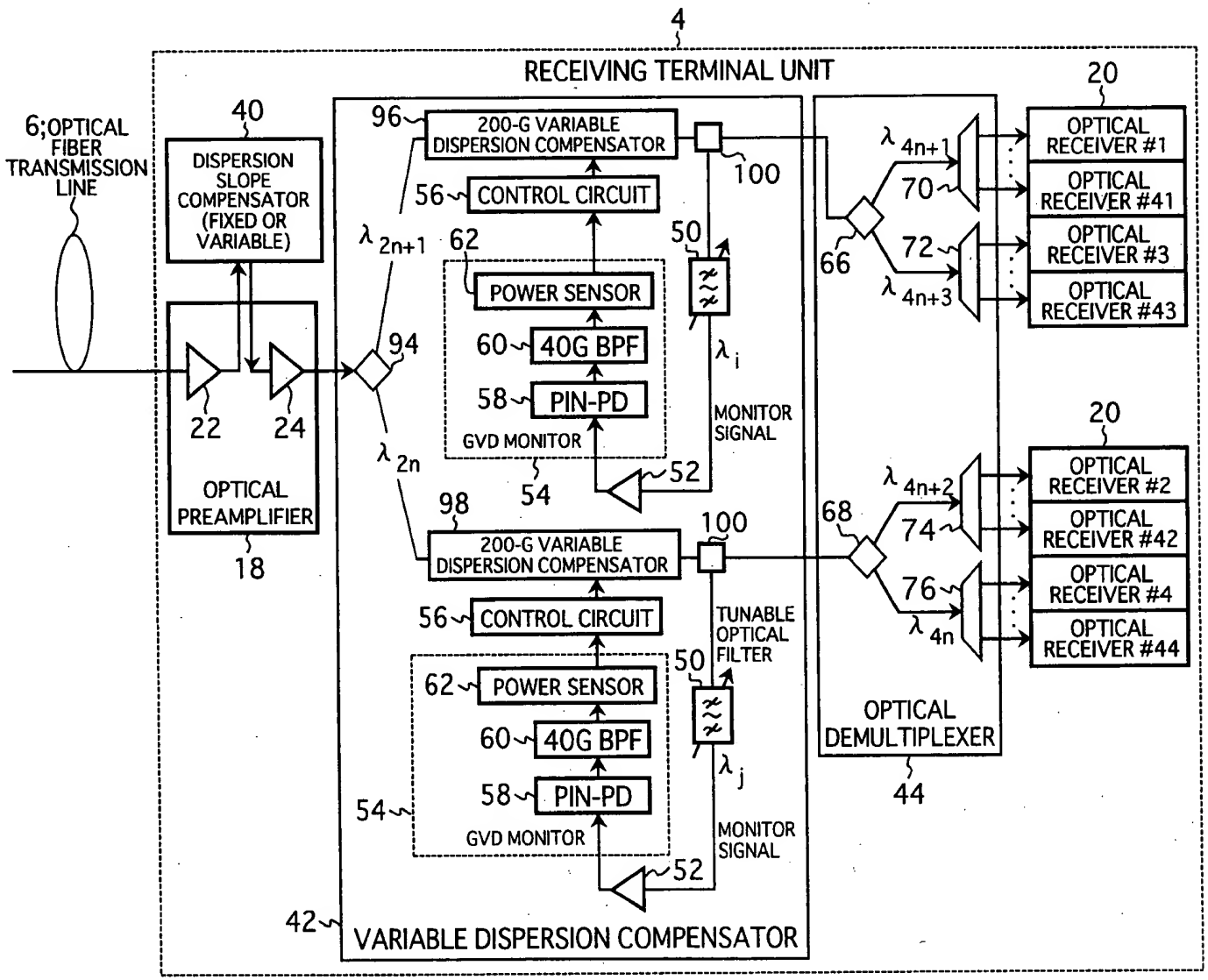
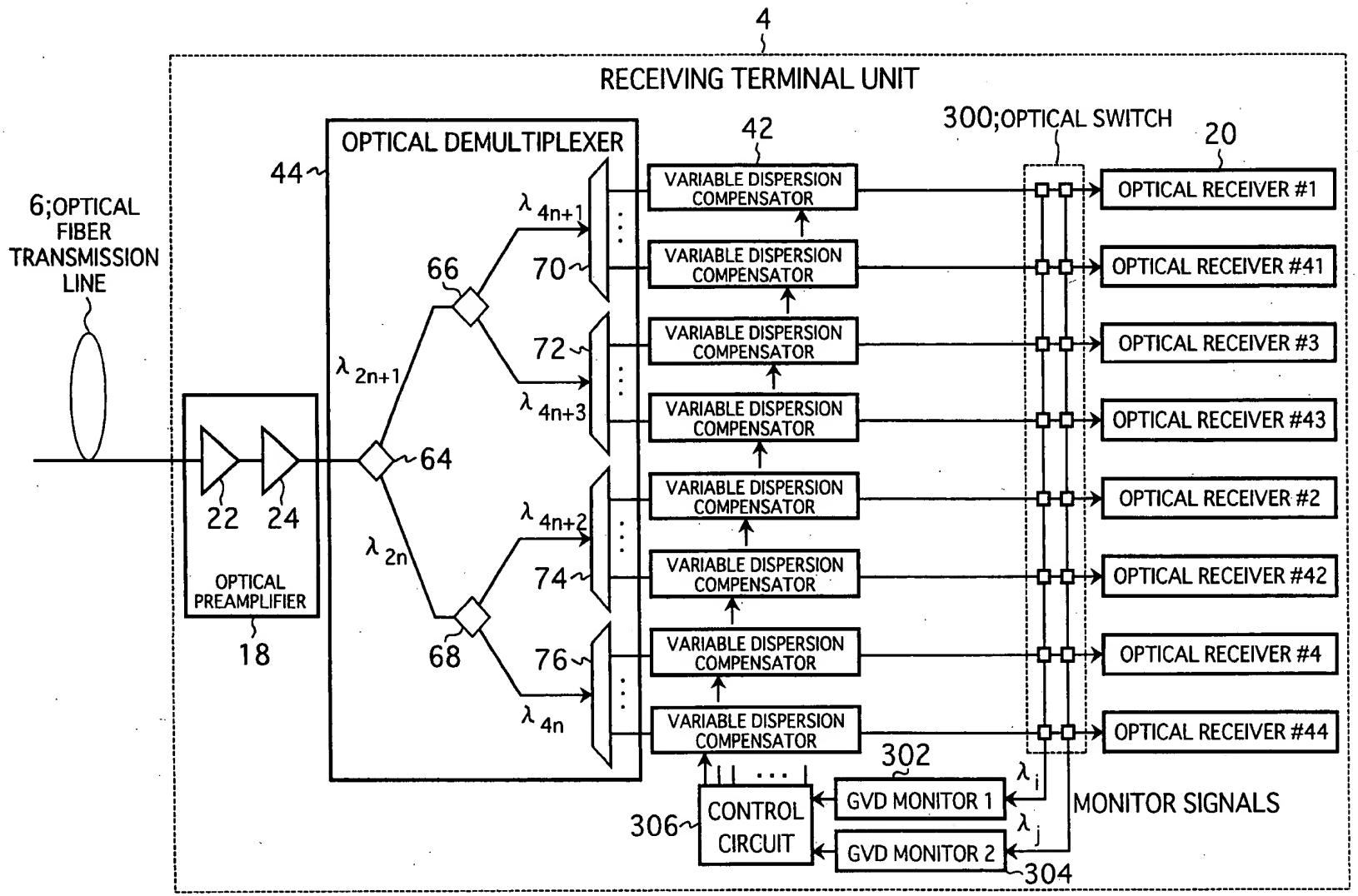

4
RECEIVING TERMINAL UNIT
6;OPTICAL FIBER TRANSMISSION LINE
40
DISPERSION SLOPE COMPENSATOR (FIXED OR VARIABLE)
OPTICAL PREAMPLIFIER
18
22
24
94
96
200-G VARIABLE DISPERSION COMPENSATOR
56
CONTROL CIRCUIT
62
POWER SENSOR
60
40G BPF
58
PIN-PD
GVD MONITOR
54
50
100
MONITOR SIGNAL
52
98
TUNABLE OPTICAL FILTER
42
VARIABLE DISPERSION COMPENSATOR
66
68
70
72
74
76
OPTICAL DEMULTIPLEXER
44
20
OPTICAL RECEIVER #1
OPTICAL RECEIVER #41
OPTICAL RECEIVER #3
OPTICAL RECEIVER #43
OPTICAL RECEIVER #2
OPTICAL RECEIVER #42
OPTICAL RECEIVER #4
OPTICAL RECEIVER #44

FIG. 33


4
RECEIVING TERMINAL UNIT
6;OPTICAL FIBER TRANSMISSION LINE
OPTICAL PREAMPLIFIER
18
22
24
OPTICAL DEMULTIPLEXER
44
64
66
68
70
72
74
76
λ 2n+1
λ 2n
λ 4n+1
λ 4n+3
λ 4n+2
λ 4n
42
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
VARIABLE DISPERSION COMPENSATOR
300;OPTICAL SWITCH
20
OPTICAL RECEIVER #1
OPTICAL RECEIVER #41
OPTICAL RECEIVER #3
OPTICAL RECEIVER #43
OPTICAL RECEIVER #2
OPTICAL RECEIVER #42
OPTICAL RECEIVER #4
OPTICAL RECEIVER #44
302
λ i
λ j
GVD MONITOR 1
GVD MONITOR 2
MONITOR SIGNALS
304
306
CONTROL CIRCUIT